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BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
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HOLLIS WEBSTER

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EDWARD LOTHROP RAND

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HABENARIA ORBICULATA AND H. MACROPHYLLA.

OAKES AMES.

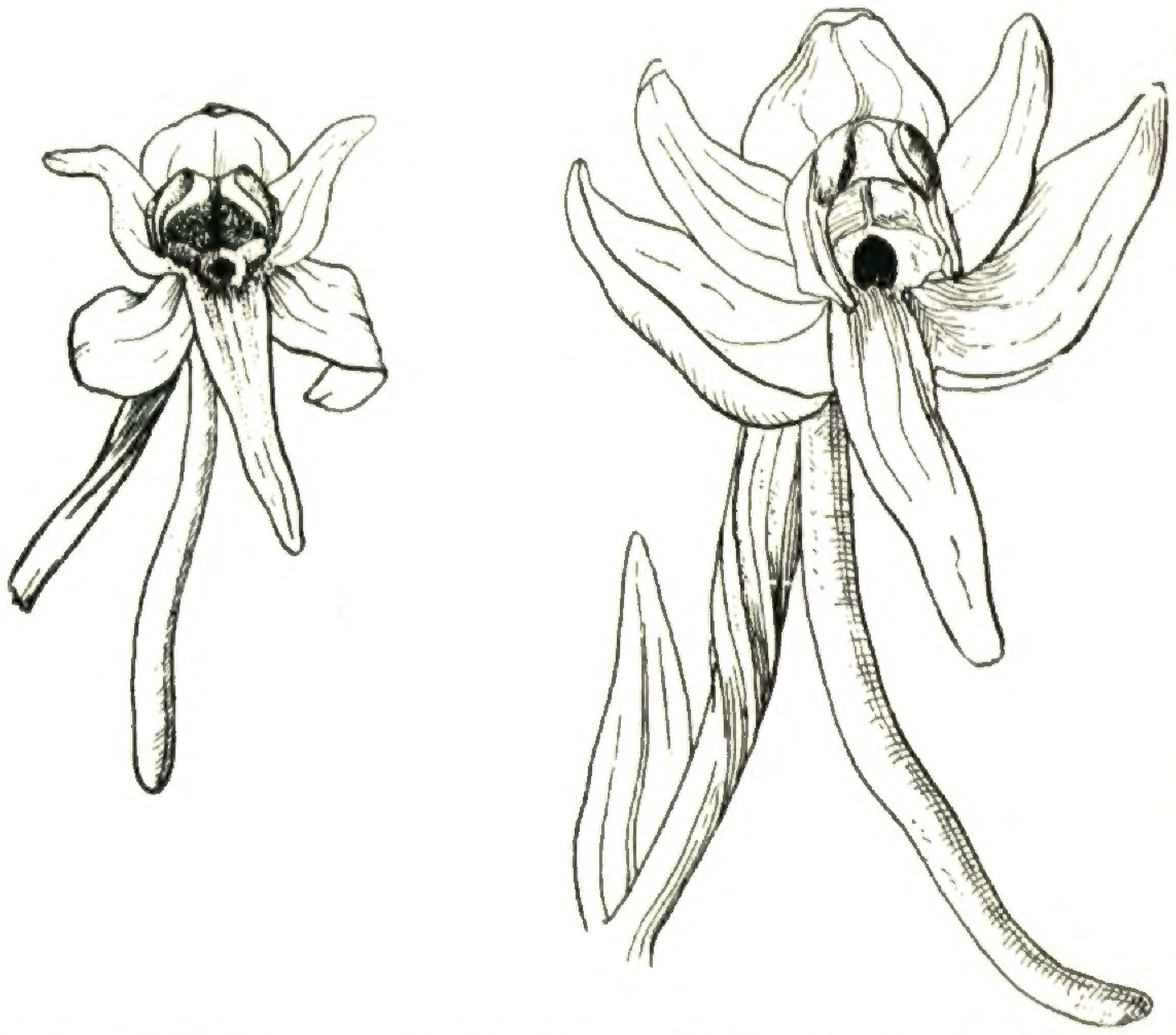
FOR several years I have observed during my studies of *Habenaria orbiculata*, Torr., that the species as at present understood includes two very distinct forms, one characterized by a short, the other by a long, spur. Attention was first drawn to this difference by Mr. J. H. Schuette who sent me a specimen of the short-spurred form collected near Mink River in Door County, Wisconsin. Mr. Schuette regarded the Mink River plant as varietally distinct from *Habenaria orbiculata*, Torr., and requested that a description of it be published. At that time it was impossible to decide which form answered to the original description of *Habenaria orbiculata*, which Pursh had published under Orchis in his Flora of North America. Furthermore it became evident that if Pursh had described the short-spurred form, then the long-spurred form would be the *Habenaria macrophylla* of Goldie that led to an interesting botanical controversy between W. J. Hooker and Dr. John Torrey many years ago, and that was unfortunately relegated to the rank of a synonym under *H. orbiculata*.

H. macrophylla was collected in Canada by Goldie and sent to Hooker with the following note "Orchis — This beautiful plant I found in shady woods Island of Montreal, approaches nearest to *O. orbiculata* of Pursh, of which I have not sent a specimen. However, that is very different —

"This species differs from *O. orbiculata* in being always 3 or 4 times larger, leaves more elliptic &c. in a living state, more thin and lucid, bracteas much shorter. The fl. are large & white — very rare.

"I have only seen a very few plants of it. I have one or two roots

alive." A description of this plant was published in the Edinburgh Philosophical Journal (**6**: 331, 1822) where the name *Habenaria macrophylla* was given to it. Subsequently in his Exotic Flora, Dr. Hooker published an excellent plate of *Habenaria Hookeri* under the name *H. orbiculata* (Pursh) and in an elaborate note indicated the differences between this plant and Goldie's *H. macrophylla*, prompted to do so, presumably, by a letter which he had received from Dr. Torrey. "It is," he writes, "with much surprise I find that my friend Dr. Torrey of New York, in a letter which he had the goodness to write to me upon the subject of Mr. Goldie's paper, considers the *H.*



Flowers of *Habenaria orbiculata*, Torr. (left) and *H. macrophylla*, Goldie (right), enlarged to the same scale.

macrophylla, of which he judges of course only by the description to be the same with *H. orbiculata* of Pursh, notwithstanding that the differences between these two plants are fully and satisfactorily pointed out in the Memoir in question. It will suffice here to mention, that *H. macrophylla* is twice the size of the present individual in almost all its parts, and that the anther is at each angle at base, prolonged into a projecting horn." About fifteen years later in Flora Boreali-Americana (**2**: 197) Hooker corrected the treatment of the Exotic Flora, and reduced *H. macrophylla* to a synonym of *H. orbiculata* with the following explanation: "This fine species, having been but ill defined by its first describer (Pursh), has been much misunderstood, and the

preceding plant (*H. Hookeri*) was by myself, as well as by other botanists, both in America and in Europe, mistaken for it. From collateral evidence, however, Drs. Torrey and Gray were led to consider the present as the true *orbiculata;* and the correctness of their ideas has been confirmed by the latter botanist, on his recent examination of the original Purshian Herbarium, in Mr. Lambert's possession."

From the preceding remarks it will be clear that *H. macrophylla* was permitted to pass into synonymy because the identity of *H. orbiculata* had been obscured by confusion with *H. Hookeri,* a related but most distinct species, and because a thorough comparison of *H. macrophylla* with the Pursh plants of *H. orbiculata* was not made. That *H. orbiculata* and *H. macrophylla* are distinguishable is in a measure proved by John Lindley's treatment of these species — which he placed under Platanthera — in Genera and Species of Orchidaceous Plants. On page 286 he brought together three species which seem clearly referable to what for convenience we may designate the *orbiculata* group. These species are *H. Hookeri, H. orbiculata* and *Platanthera Menziesii.* Of these we may neglect the first as its identity is unquestionable. The second is characterized in part by having the spur twice longer than the ovary, and in the synonymy which accompanies it we find *H. macrophylla.* The third, collected by Menzies on the west coast of North America — a species which does not appear in our manuals of botany, and which has remained in obscurity — is characterized by having a spur subequal with the ovary. This third species Kränzlin in his Genera et Species Orchidacearum, has unwittingly confused with *H. elegans,* Bolander, as to description and as to the Californian plant which he has cited as no. 6252, Bolander.

The inadequacy of Lindley's original description, and Kränzlin's discrepancies made desirable a more intimate knowledge of the type specimen. A photograph obtained at Kew by Dr. Robinson made this possible and proved conclusively that *Platanthera Menziesii* is the short-spurred form of *Habenaria orbiculata.* Subsequently I examined the type and also several sheets of specimens which Menzies had collected, and satisfied myself that the conclusions which I had drawn from a study of the photograph communicated by Dr. Robinson were correct. Lindley, then, on the supposition that the long-spurred form representative of Goldie's *H. macrophylla* was conspecific with the Pursh type of *H. orbiculata,* had considered the short-spurred form a distinct species. Having arrived at this point, it became ab-

solutely essential to know what Pursh had described as *Orchis orbiculata.* According to Pursh's Flora Americae Septentrionalis, *Habenaria orbiculata* inhabits the mountains of Pennsylvania and Virginia and blooms in July and August. Our present knowledge of the distribution of the species as far as the short-spurred form is concerned, extends this range to Canada and Alaska in the north, and to Minnesota in the middle west. The long-spurred form is rather rare and as represented in the principal herbaria of the United States does not reach so far south as Pennsylvania and Virginia and does not occur west of Wisconsin. Therefore, the evidence supplied by distribution would make it seem that the Pursh plant must have been characterized by a short spur. According to Pursh's Journal of a Botanical Excursion in the Northeastern part of the States of Pennsylvania and New York during the Year 1807, he found a Habenaria late in June in Pennsylvania, which he called *Orchis bifolia* because of its resemblance to the European species so called in his time. He gave an elaborate account of it and his description agrees well with the character of *H. orbiculata,* although it does not distinguish his material from the long-spurred form which Goldie called *H. macrophylla.* Unfortunately Pursh's herbarium is no longer intact as it was distributed at the sale of the Lambert collection of which it formed a part; but in my search for an authentic specimen I found at Kew a sheet which I think may be accepted as the type of his *Orchis orbiculata.* It is a sheet from his own herbarium and was presumably acquired for Dr. Hooker at the Lambert sale. The spur, which is 2 cm. long, distinguishes the plant at once from *H. macrophylla,* Goldie, and establishes the identity of *Platanthera Menziesii,* Lindley, which we must regard as conspecific with the Pursh plant.

While on the preceding pages *Habenaria orbiculata* and *H. macrophylla* have been separated by the length of the spur, the two species are readily distinguishable by other differential characters. That the spur length, however, is the most useful diagnostic character cannot be denied. It is not an arbitrary distinction and does not lead to artificial discrimination among specimens, irrespective of distribution and habitat. The diagnostic value of the spur is clearly shown by the following tabulation of length-frequencies.[1]

[1]The spurs of *Platanthera Menziesii* are not included in the measurements as Lindley's type and the British Museum specimens collected by Menzies are not fully developed.

H. orbiculata.

Length (mm.)	16	17	18	19	20	21	22	23	24	25	26	27	28	29
No. of cases observed,	2	2	7	7	9	4	1	2	1	3	2	1	0	0

H. macrophylla.

Length (mm.)	30	31	32	33	34	35	36	37	38	39	40	41	42	43
No. obs.	0	0	1	0	1	6	3	7	2	1	2	0	1	1

These figures illustrate the fact that in *Habenaria orbiculata* Torr. the most frequent spur-length is about 2 cm. and that in *H. macrophylla,* Goldie, the most frequent length is 3.5–3.7 cm. The flowers of *H. orbiculata* are considerably smaller than those of *H. macrophylla,* as is shown by the accompanying text cuts. The following shows what seems to be the most satisfactory treatment of the species herein considered.

Habenaria orbiculata, Torrey, Compendium, 318 (1826).— *Orchis orbiculata,* Pursh. Fl. Am. **2**: 588 (1814).— *Platanthera Menziesii,* Lindley, Orch. Pl. 286 (1835).— *Lysias orbiculata,* Rydberg, Britton's Manual 294, in part.— Spur 1.6–2.7 cm. long. South Carolina, Tennessee, Maine, westward to Minnesota and Washington, and northward.

Habenaria macrophylla, Goldie, Edinb. Phil. Journ. **6**: 331 (1822).— *Platanthera orbiculata,* Lindley, Orch. Pl. 286 (1835).— *H. orbiculata,* Britton and Brown, Ill. Fl. **1**: 461 (excl. fig.).— *Lysias orbiculata,* Rydberg, Britton's Manual 294, in part.— Spur 3.2–4.3 cm. long. Connecticut to Wisconsin and northward.

North Easton, Massachusetts.

HYBRIDISM IN THE GENUS VIOLA,— II.

Ezra Brainerd.

The discussion of this subject, commenced over a year ago,[1] I purpose to resume in this and a subsequent paper. During the past year the problem has been studied persistently; most of the known aberrant forms of northeastern America have been grown in the garden; and several journeys through the coastal region of the Middle and New England States have been made to observe anomalous plants in their natural surroundings. I take pleasure in saying that in all this investigation I have been greatly assisted by the kindness of numerous students of the genus, who have sent me living plants and herbarium specimens, and have seemed to spare no pains to guide me to stations of special interest.

The result of these observations is to confirm in every particular the inferences of my previous article, and, furthermore, to bring to light some twenty-five additional hybrids and crosses in the genus Viola. In short, as regards at least the blue acaulescent violets of northeastern America the general rule seems to be inductively established, that *of the currently recognized species any two, that have been growing together for several years, are likely to present hybrids.*

Before entering upon the details of this evidence, certain preliminary matters should be presented, as helpful to a better understanding of the problem.

Hybridism among European Violets.

It is interesting to note that in recent years a similar tendency to interbreed has been recognized in the European species of Viola. In the last edition of Garcke's Flora of Germany eighteen violet hybrids are reported as having been found among their twenty species. In a list of the plants of Norway and Sweden published in 1900 twenty-two violet hybrids are enumerated among their twenty-seven species. In a recent number of the Botanische Zeitschrift Dr. Heinrich Sabransky gives a list of ten species and nine hybrids that he has found in a

[1] Rhodora, vi. 213–223, Nov., 1904.

somewhat limited district of Austria, and remarks on the "most extraordinary tendency of the forms to hybridize; in no other genus does there appear such a multitude of hybrids as among the violets." Our blue stemless violets are all distinct from those of Europe, but the disposition to hybridize seems to manifest itself in all groups of the genus, and on both Continents.

Laws relating to known Hybrids among Flowering Plants.

To appreciate the evidence that certain forms of Viola are hybrids, one should have some definite knowledge of the usual behavior of known hybrids in other genera. This is well set forth in Focke's great work,[1] which contains a compendious account of the two or three thousand artificial and natural hybrids known at the time of publication, and discusses the general laws governing this group of phenomena. In regard to hybrids between *nearly related* but *distinct* species their behavior as a rule may be stated as follows:—

1. The hybrids have characters that are intermediate between the unlike characters of the parent forms.
2. They and their offspring are stable; that is, the several individuals resemble each other as closely as those that result from normal sexual reproduction.
3. They are more or less infertile, usually from defective pollen.
4. They are unusually vigorous in their vegetative functions; their flowers also are larger and remain longer in bloom.

These four laws precisely describe the behavior of the hybrids between any two *well-marked* species of our blue stemless violets. If one parent is pubescent and the other glabrous, the hybrid will be somewhat pubescent; if the cleistogamous peduncle in one is long and erect, and in the other short and deflexed, it will be of medium length and ascending in the hybrid; if the cleistogamous capsule is green in one parent and purple in the other, it will as a rule be green but more or less flecked with purple in the hybrid. Furthermore, the hybrids and their progeny are fairly constant. Thirty seedlings

[1] Die Pflanzen-Mischlinge von W. O. Focke, Berlin, 1881. Octavo, 570 pages; no English translation.

of *V. affinis×septentrionalis* have been under cultivation since July, 1904, and they all look just alike. About twenty plants of *V. cucullata ×fimbriatula*, from three different States show no appreciable difference. Also the infertility of these hybrids is most noticeable; rarely are more than 30 per cent of the ovules fertilized, usually about 10 per cent, occasionally none. Focke[1] has noted the marked infertility of the European hybrids of Viola. Lastly, the rank growth of violet hybrids is most pronounced. In many cases I have the hybrid growing side by side with the parent species, and always the robustness of the hybrid is strikingly apparent. I have frequently made eight or ten ample specimens out of one plant. On one individual of *V. affinis×sororia* I counted last May 148 large petaliferous flowers.

But when crosses are made between *doubtfully distinct* species, or between races, or between a species and its variety, there is commonly a marked departure from the first three of the laws above stated, viz.—

1. The offspring of such crosses have not intermediate characters, but various recombinations of the unlike characters of the parent forms.
2. The individual plants are consequently often dissimilar, some reverting to one or the other of the parent forms, others presenting all sorts of compromises,— a phenomenon known to breeders as "sporting."
3. There is no impairment of fertility either in the first or in subsequent generations.

To this class belong the so-called Mendelian hybrids,— the despair of the systematist, but the vantage ground of the breeder of new and useful "varieties."

The latest discussion of this subject is to be found in the recently published volume of DeVries. This author makes a sharp distinction between a specific and a varietal character. The latter he regards as but the loss or latency of a quality, which is positive and dominant in the typical form of the species. When interbreeding takes place, he holds that specific characters are affected according to the first set of rules above cited; but varietal characters according to the second set. I can make but the briefest allusion to this novel explanation of the phenomena of hybridism, and my excuse for so doing is that it seems to find illustration in the behavior of certain crosses between

[1] L. c., p. 477.

closely allied forms of Viola. DeVries holds that ordinary species "differ from each other partly in specific, partly in varietal characters. As to the first, they give in their hybrids stable peculiarities, while as to the latter, they split up according to Mendel's law."[1] This, as I hope to show, is exactly what takes place, when two such species as *V. fimbriatula* and *V. sagittata* interbreed. Dr. Sabransky also observes that in Austria "among the stemless violets, hybrids present for the most part a more or less distinctly intermediate character; while among the stemmed violets, they present an unbroken series of transitional forms between the parents, whose characters thus become confluent."[2]

Are specific Distinctions endangered by Hybridism?

Some systematists seem disturbed at the discovery that certain groups of nearly related species freely interbreed. It seems to admit, as one of our keenest observers has expressed it, the existence of "a mutually destructive influence, breaking down the individual characters of species, and merging them finally into one." Surely, hybridism is a movement in this direction. But we must remember that the advance of living organisms proceeds through the conflict of two opposing forces, the one leading to multiform variation, the other seeking to conserve the type by requiring double parentage. Thus the aberrant traits that may arise in an individual by mutation or fluctuation, are usually eliminated in succeeding generations by the repeated process of pairing with normal individuals. This conflict ordinarily ceases with the pronounced establishment of separate species; but within several groups of Viola, consisting of forms but recently ranked as species, the conflict seems to be exceptionally prolonged.

But we may, I fancy, discover the cause of this exceptional behavior. The power of sexual reproduction to maintain uniformity in a group of plants is so great, that for the evolution of two or more species out of one the incipient species need in some way to be isolated from each other. Darwin describes the fauna and flora of certain oceanic

[1] "Species and Varieties, their Origin by Mutation," p. 307.
[2] Translated from "Allgemeine Botanische Zeitschrift," xi. 162, Oct., 1905.

islands as consisting of species distinct from but allied to those of the neighboring mainland; free intercourse over a connecting isthmus would have largely prevented this divergence into two sets of species.[1] In many genera we know that certain species remain distinct only because each has its separate range; if through the agency of man they are brought together, they become more or less confluent through interbreeding.— Some years since I was interested in the study of Aquilegia; I got together as many species as possible of both the Old World and the New, and became quite familiar with the various types. Afterward, when they had been growing for several years without cultivation on the north side of an arbor-vitae hedge, my attention was attracted by the appearance of forms that I had never seen before. I found that at least five different hybrids had appeared spontaneously. Similar instances are by no means rare.

An analogous cause has disturbed the relations to each other of our species of common blue violets. Two or three centuries ago the northeastern United States was entirely covered with forests. The clearing away of these forests by man has profoundly modified the conditions of plant life. With the exception of *V. palmata*, our blue stemless violets are rarely found, and certainly do not thrive, in the primeval forest; they are rather plants of open groves, of fence-rows, and moist meadows. When the whole country was densely wooded, their growth must have been greatly restricted; but when the trees were removed they had a chance to 'run and be glorified'; their range was vastly extended; the number of individuals increased perhaps a thousandfold; species before isolated became cohabitant, and had opportunities to hybridize.[2]

How far this movement of involution will extend, it is idle to speculate. But so far as regards the survival of our species of Viola we need give ourselves no concern; for the vast majority of its seeds are produced from the self-fertilized flowers, and must therefore be free from admixture with other species. However readily the petaliferous flowers may produce hybrids, these hybrids must always be greatly outnumbered by the legitimate offspring.

Middlebury College.

[1] The Origin of Species, 6th ed., ii. 177–182.

[2] It would be interesting to follow out this line of thought in its bearing on other groups of species, such as Crataegus and Rubus. There are not wanting grounds for the suspicion that they too, since the forests were cleared, have enormously multiplied, and have been behaving badly,—producing hybrids and Mendelian crosses,— sporting wantonly, — at the expense of the makers of species.

A NEW GEUM FROM VERMONT AND QUEBEC.

M. L. Fernald.

In June, 1898, Mr. W. W. Eggleston collected at Mendon, Vermont, a Geum which he sent without name to the Gray Herbarium. The specimen was in anthesis, and without detailed examination was passed as *Geum macrophyllum* Willd.

On July 6 last, however, a Geum quite like Mr. Eggleston's Mendon plant was found by Messrs. E. F. Williams, J. F. Collins and the writer in a boggy meadow by the St. Lawrence at Bic in the County of Rimouski, Quebec. At Bic the plant which was nearly past anthesis attracted immediate attention by its large wide-spreading crimson calyx, deep claret-colored styles, and the strongly contrasting broadly obcordate bright yellow petals; and only in the outline of the leaf did it suggest the common *Geum macrophyllum* of the lower St. Lawrence and northern New England. That well-known plant abounds at Bic and a superficial examination was sufficient to show that, in its small green recurved calyx, its greenish or barely crimson-tinged styles, and its small narrow pale petals, it had little in common with the plant now seen growing for the first time.

Detailed study of the new plant shows that its only immediate allies in America are *Geum rivale* L. and *G. geniculatum* Michx., while in many characters it is nearer the Scandinavian species, *G. hispidum* Fries and *G. intermedium* Ehrh. To none of these species does the plant of Bic and Mendon seem to be referable, and it has been impossible to find any plant to which it is more closely allied. It is apparently a somewhat local representative of Seringe's section *Cariophyllata*, which may be sought with confidence elsewhere in New England and eastern Canada, and which on account of the effective contrast of colors in its flowers may be called

Geum **pulchrum** sp. n. Caule erecto piloso-hispido apice glanduloso-puberulo 4–11-floro; foliis radicalibus interrupte pinnatisectis subtus hispidis lobis obovatis dentatis, foliis caulinis trilobis lobis obovatis; stipulis anguste ovatis argute serratis; pedunculis purpurascentibus tenuibus; floribus nutantibus; calyce purpurascente, laciniis patentibus deltoideo-ovatis; petalis suborbicularibus obcordatis flavis; filamentis badiis vel purpurascentibus; carpellis setosis, stylis elongatis valde purpureis geniculatis, appendicibus plumosis coccineis.

Stem 4–9 dm. high, erect, rather slender, somewhat pilose-hispid throughout, glandular-puberulent above, 4–11-flowered: basal leaves interruptedly pinnate, 1.5–3.5 dm. long, hispid below; the 3 approximate obovate terminal lobes shallowly lobed and coarsely dentate, the uppermost largest (5–9 cm. long, 4–8 cm. broad), with 4 to 6 unequal pairs of subopposite or scattered ovate lobes (0.5–4 cm. long) below; cauline 3-lobed or -parted, the lower short-petioled, the upper sessile, the leaflets obovate (or the uppermost lanceolate) sharply toothed, mostly 3–5.5 cm. long: stipules narrowly ovate sharply and coarsely toothed, 1–2 cm. long: peduncles purplish, slender, at first nodding, later becoming erect: calyx purplish, in anthesis 1–1.3 cm. broad, becoming larger in fruit, cleft half-way to base into deltoid-ovate acuminate strigose wide-spreading lobes, with linear-subulate alternating teeth (1 mm. long): petals 7 or 8 mm. long, bright yellow, suborbicular, obcordate, narrowed to short claws: filaments yellowish or purplish: carpels bristly below with ascending yellow-white hairs; the elongate deep-purple styles jointed above the middle, the upper plumose portion carmine: fruit not seen.— QUEBEC, boggy meadow by the St. Lawrence, Bic, July 6, 1905 (*Williams, Collins, & Fernald*): VERMONT, Mendon, July 16, 1898 (*W. W. Eggleston*).

GRAY HERBARIUM.

A HYBRID ASPLENIUM NEW TO THE FLORA OF VERMONT.

GEORGE E. DAVENPORT.

THE finding of a hybrid Asplenium at Proctor, Vermont, by Mr. G. A. Woolson of Pittsford Mills, is of more than ordinary interest, both on account of the accurately noted environment and because the fern although previously known as a European plant has never before been recorded in America. It is the *Asplenium Trichomanes* × *Ruta-muraria* of Ascherson & Graebner[1] of which several somewhat varying forms have been contrasted in parallel columns by Christ.[2] Mr. Woolson's account of his discovery gives the following details.

Passing over a ridge at Proctor, Vermont, he paused in an open space to see what was growing on and between the outcropping

[1] Synopsis der Mitteleuropäischen Flora, i. 79 (1896).
[2] Die Farnkräuter der Schweiz, 97, f. 15 (1900).

rocks. Here his attention was attracted by a clump of ferns with pinnae which appeared abnormal and he took specimens together with others of *Asplenium Ruta-muraria*, which were growing three feet from the clump in question. On closer inspection later Mr. Woolson suspected that the anomalous fern was the result of a cross between *A. Ruta-muraria* and *A. Trichomanes* and returning to the spot he "went on hands and knees" over practically all the neighboring ground in search of the other parent plant. The only species growing in abundance was *A. Ruta-muraria*, much of it young; but a few fruited plants were found not over a foot from the particular clump in question. About eighteen feet away there was some *Pellaea atropurpurea*, with a "touch of *Camptosorus* and *A. ebeneum*" but no *A. Trichomanes* in sight although the habitat appeared just right for that species. However, on following a dip in the ridge over another rise and down over the edge of a steep bank facing the north, Mr. Woolson found an abundance of *A. Trichomanes*, as well as a second lot under the shelving edge of a ridge a little more to the east. Either place was fully a hundred and twenty-five feet from the rock bearing the hybrid fern.

While admitting that the peculiar fern looks much like a hybrid between *A. Trichomanes* and *A. Ruta-muraria*, Mr. Woolson expresses doubt as to the power of the wind as a possible agency in transporting the spores of *A. Trichomanes* to such a distance and over such barriers.

But we know that the wind is capable of doing most extraordinary things, and it is always the unexpected that happens. So many instances of this have occurred in my own experience that I have long ago ceased to wonder at anything of the kind being brought about through the agency of the wind, and the fact of fern spores being swirled about and distributed into all manner of seemingly inaccessible places is not so great a source of wonderment to me as the facts of hybridization itself.

Ferns are constantly intermingling in vast numbers under conditions most favorable for interbreeding and producing a great diversity of variant forms, yet these forms are for the greater part readily referable to one or the other of well established genera and species. Seldom indeed do we find any that can be considered for an absolute certainty as hybrid combinations; such, however, seems to be the case in the present instance beyond any reasonable doubt, and the apparent

difficulty of wind-blown spores having reached the seemingly inaccessible niche where this hybrid fern was found was no greater than in some other instances of sporal migrations previously recorded by me.

When first received the dual characters and resemblance of the newcomer to *A. Trichomanes* and *A. viride* impressed me with the possibility of its being a hybrid between those two species, but the absence of the latter from that section altogether led me to treat it provisionally as a form of *A. Trichomanes*. The later and fuller information subsequently received, however, led to a further investigation that enabled me to identify it properly through an admirable figure published by Dr. Christ (l. c.) of a somewhat larger form from Lugano.

Three forms of this hybrid, to which specific names had been given, were brought together under the present combination by Ascherson and Graebner in the work already cited, and these are arranged by Dr. Christ under comparative descriptions with his own account of the large form from Lugano.

The following brief diagnosis will, I think, sufficiently indicate the general characters of our Vermont plant. Sporophyte small with the habit of *A. Trichomanes*. Fronds 6 to 10 cm. long, elongate, lanceolate, broadest at base; stipe and lamina of nearly equal length, stipe and lower half of rachis brownish black as in *A. Trichomanes*, then green above as in *A. viride* (the young growing fronds wholly green), wingless; lamina pinnate with 7 to 8 pair of short-stalked pinnae, and an enlarged terminal one with shallow lobes on one or both sides, those below, to about the middle of the lamina, entire, the uppermost obovate, the lower ones broadening and becoming roundish ovate with cuneate bases, below the middle increasing abruptly in size, more or less lobed with rounded lobes, the second pair deeply lobed or 3-parted, the lowermost pair fully 3-parted with the upper basal lobe quite distinct. Margins crenulately denticulate. Sori short, becoming confluent and covering the lobes at maturity. Indusium irregularly denticulate. Proctor, Vermont, August 29, 1905, *G. A. Woolson*.

The essential characters of the parent plants are reproduced in their offspring as follows:—

1st. TRICHOMANES characters are seen in the brownish-black stipe the lower portion of rachis, and partially also in the shape of the upper pinnae.

2nd. RUTA-MURARIA characters are seen in the long stipes and

green upper portion of the rachis, the distant pinnae, and more especially in the 3 parted lower pinnae.[1]

The dimensions of our plant fairly approximate those given by Ascherson and Graebner (l. c.), but the Lugano form described by Dr. Christ exceeds those dimensions by about one third, the fronds reaching a length of 15 cm. as seen in the fine figure published by that author.

Our plant, however, differs from the European forms already published in having the lower pinnae more deeply lobed or even divided, and this inclined me at first to treat it as a distinct form, but in view of the well known disposition on the part of hybrids to produce all manner of deviations, and the existence of certain other deviations in the European forms, it has seemed best to regard all such deviations as of minor importance and to recognize only the one combination.

Mr. Woolson is to be congratulated on his interesting discovery, which adds new evidence of the unity of the American and European fern floras. It should also be a spur to fern-students and encourage them to search carefully for other fern treasures that lie hidden awaiting only the advent of some keen eyed observer to bring them out into the light.

MEDFORD, MASSACHUSETTS.

SPIRANTHES OVALIS.

OAKES AMES.

IN 1840, Dr. John Lindley published the description of a new species of Spiranthes collected by Drummond in Texas and in allusion to the oval form of the inflorescence called it *S. ovalis*. From that time on the specific name was not taken up by American botanists and at present is not applied to any American species in our botanical publications. The explanation of this is perhaps simple, as *S. ovalis* is one of the rarest of the Spiranthes species which are natives of the United States, and as the description in Lindley's Genera and Species of Orchidaceous Plants is a wholly inadequate characterization.

[1] A print from one of Mr. Woolson's specimens since seen, shows at least one of the lower pinnae not only with three distinct lobes, but with the outer lobe becoming again slightly 3-lobed.

When A. W. Chapman prepared the third edition of his Flora of the Southern United States he described a new variety of *Spiranthes cernua*, Rich., and named it var. *parviflora*. The type was collected in rich oak woods near Rome, Georgia. Later, Dr. Small, as shown by his Flora of the Southeastern United States, recognized that Chapman had strained affinities in making the Georgian plant a variety of *S. cernua*, and he, therefore, raised it to specific rank under Gyrostachys. In my treatise on the American Species of Spiranthes, published in Fascicle I of Orchidaceae, I placed this species, doubtfully, next to *S. Romanzoffiana* on account of the constriction of the lip in several specimens examined. Last November at Kew a comparison of *Spiranthes parviflora* with *Spiranthes ovalis* Lindl. proved that they were conspecific. The type comprises three individuals preserved in the Hookerian Herbarium.

Spiranthes ovalis is of special interest as it is not confined to the states of the extreme south and as the northern limits of its distribution bring it within the area covered by Gray's Manual. According to studies of the material in the principal herbaria of America and England it is most common in Missouri, where George Engelmann collected specimens as early as 1835, and where as recently as September, 1905, it was found by B. F. Bush (no. 3322). How such a distinct species has been omitted from our manuals devoted to the botany of the northern United States is difficult to explain. It is very similar in aspect to *Spiranthes latifolia*, Torr., and might easily be mistaken for it, but *S. latifolia* is a summer bloomer, while *S. ovalis* does not bloom until the fall of the year, even in the southern states, a fact which should have led to careful investigations. Furthermore, the flowers of the two species are quite different, and the scape of *S. ovalis* is much taller in relation to the leaves than the scape of *S. latifolia*.

Spiranthes ovalis Lindley, Orch. Pl. 466 (1840).— *S. cernua*, var. *parviflora*, Chapm., Fl. S. U. S. ed. 3, 488 (1897).— *Gyrostachys parviflora*, Small, Fl. Se. U. S. 318 (1903).— *Spiranthes parviflora*, Ames, Orchidaceae, Fasc. 1, 137 (1905). Lip ovate, 4–5 mm. long, sometimes constricted above the middle, few nerved, membranaceous; nipples slender, elongated, strongly curved. Distribution: Georgia, westward to Indian Territory; Tennessee and northward to Missouri and Illinois. In shady moist woods and on high wooded hills, September and October.

North Easton, Massachusetts.

A NEW RUBUS FROM CONNECTICUT.

W. H. Blanchard.

Rubus Andrewsianus, n. sp. Plants pubescent with frequently a few stalked glands on the inflorescence and remarkably long, stout and numerous prickles. Inflorescence ending leafy branches.

New canes. Stems erect or recurving but never reaching the ground, 3 to 5 feet high, stout, often ⅜ in. in diameter, reddish on the upper side; branched in rich open places, glabrous, strongly 5-angled and furrowed. Prickles ¼ of an inch long, 7 to 15 to the inch, straight, perpendicular to the stem and on its angles only. Leaves of moderate size, 8 in. long and 7 in. wide, 5-foliate, dark yellow-green above with numerous appressed hairs, lighter below and velvety to the touch with abundant appressed pubescence. Leaflets oval, the middle one sometimes slightly cordate; outline entire, finely and doubly serrate-dentate, short taper-pointed, the upper ones rounded at the base, the basal ones cuneate, rather thick, about twice as long as wide, the middle one slightly wider. Petiole and petiolules grooved, stout, glandles, covered with long soft pubescence and numerous strong hooked prickles in three rows continued in one row on the midrib; the petiolule of the middle leaflet about an inch long, those of the side leaflets about one-third as long, and the basal ones sessile.

Old canes. Erect, not pulled down by snow or weight of foliage or fruit, prickles intact. Second year's growth entirely of leafy branches generally one from each old leaf axil, somewhat zigzag, tipped with the inflorescence. Branch stems terete, slightly pubescent, prickles straight, slanting backward. Terminal branches 4 to 6 in. long with leaves mostly 3-foliate, some unifoliate, and ending in a short raceme pubescent with frequently a few stalked glands intermixed, quite regular, an inch long with 8 to 12 flowers on slender pedicels an inch long or less set at a great angle to their axis. Bracts small, never leafy-bracted. Lower branches often 20 inches long, the numerous leaves mostly 3-foliate occasionally 5-foliate, inflorescence scanty or wanting. Intermediate branches increasing regularly in length downwards and the amount of inflorescence on their tips as regularly decreasing. Leaflets oval or ovate, generally rounded at the base, pointed, the middle one stalked; outline

entire, pubescence, color and serration as in those of the new canes, prickles smaller. Flowers showy, 1 to $1\frac{1}{2}$ in. broad, petals two-thirds as wide as long, abruptly narrowed into a rather long claw. Fruit normally short cylindric, sepals not conspicuously reflexed, drupelets large and black; a typical good fruit being $\frac{1}{2}$ in. high and $\frac{9}{16}$ in. wide with 30 drupelets $\frac{3}{16}$ in. in diameter. Not very productive. Flowers about June 15, the fruit ripe Aug. 15. An abnormal form with yellow crumpled leaves, blasted fruit and long sepals frequent in this species and not unknown in some others.

Type station "Lazy-lane," Southington, Conn. Ranges from Southwick, Mass., and Old Lyme, Conn., to Bedford Park, N. Y. City. Probably widely distributed. Open places in dry ground.

This stalwart plant I first found in Southwick, Mass., in August, 1903, near the depot. Journeying on foot I found it all the way to Southington, Conn. Mr. C. H. Bissell and Mr. Luman Andrews had it in their herbaria. In July, 1904, I collected it in Southington and Bristol and also in June and August, 1905. In June, 1905, I collected a plant in Bedford Park, New York City, which differs slightly from this having even longer prickles, middle leaflet on new canes ovate, and more quinate leaves on the old canes. It was common there. A specimen in the Gray Herbarium, numbered 116, collected by Dr. C. B. Graves June 12, 1900, at Old Lyme, Conn., is evidently this species as well as no. 288, one of the abnormal forms mentioned, collected by him at the same place Aug. 18, 1902.

It is with pleasure that I associate with this fine plant the name of Mr. Luman Andrews an enthusiastic and tireless collector and joint author with Mr. C. H. Bissell of the "Flora of Southington, Conn."

This blackberry can be readily distinguished at a glance by its formidable prickles and leafy branches tipped with flowers or fruit. It is not probable that any of the cultivated forms have sprung from this species.

WESTMINSTER, VERMONT.

OBSERVATIONS UPON POGONIA (ISOTRIA) VERTICILLATA.

(Plate 65).

Homer Doliver House.

A large colony of the rare orchid *Pogonia verticillata* (Willd.) Nutt. was recently observed near Washington, D. C., by Mr. Joseph H. Painter of the National Museum, and the writer. It was discovered that many if not all of the plants were connected in groups of two to four or more plants by perennial horizontal rhizomes, one to six feet in length. In the accompanying photograph (plate 65) a small group is shown, consisting of two mature flowering plants and a young plant without a flower, connected by a single root-system, the entire extent of which measured about three feet. There is also shown a single plant with two flowering stems.

Inquiry revealed the fact that the nature of the roots of this orchid is almost unknown, even to many of those familiar with it growing. In systematic literature we find the following scanty or misleading descriptions of the root of Pogonia:—Beck, "perennial"; Darlington, "root of fleshy fibers"; A. Gray, "root a cluster of fibers"; Britton's Maunal, "rootstock and fibrous roots,— stems from long fleshy roots." Rafinesque, Eaton and Wood, do not mention the root. Recently, J. G. Hall (Rhodora 7: 49. M. 1905) mentions having seen roots of this species "18 to 20 feet long."

The perennial rhizome of *Pogonia verticillata* is horizontal and gives rise to new stems by buds which when partially developed give off fibrous roots, just above the origin of the new stem, similar in all respects to the somewhat fleshy, brittle rootstocks. These roots,

usually three to nine to a stem, vary greatly in length, some of them becoming rootstocks by the budding of new stems. Seedling plants must therefore develop this system of root-fibers before new plants can arise by budding. Seedlings are, however, very scarce and fully 90 per cent of the plants in any single, well developed colony arise by the budding process from the rootstocks. In age the rootstocks become very brittle and the older connections are easily destroyed and apparently in many cases perish from decay so that while it is common to find a colony a hundred feet in diameter, it is extremely rare to find a single system more than a few feet in extent, owing no doubt to the perishing of the connecting rootstocks after a few seasons. The individual plants once established are perennial, and flower several seasons at least, as is shown by the withered stems of former seasons, frequently found persisting and shown in plate 65.

The habitat of this species is usually given as "low woods," a statement which although not absolutely wrong needs some qualification. The species seems to prefer a moist, soft, rich and well divided leaf-mould and under these conditions is often found on comparatively dry hills, always under some shade, usually of deciduous trees but often evergreens and preferably on a slope with a northern or eastern exposure.

In some localities (observed in Central New York by the writer) it is found growing in sphagnum and the rhizomes under this condition attain a much greater length than in soil.

The coloring of the floral organs seems to have obtained scanty mention, perhaps from the fact that the plants usually turn black in drying. The two lateral lobes of the lip as well as the lateral margins are tinged and veined with a bright crimson-purple, most vivid at the apex of the lobes, while the broad, crenulate, deflexed middle lobe is pure white. The crest of the lip is green and papillose. The two upper petals are light green and arching above the lip nearly conceal it although the lip and petals spread somewhat apart in age. The filiform sepals are dull reddish-purple.

The whorl of lanceolate leaves is rarely fully developed or even expanded at flowering time as is usually shown in illustrations. The stem of *Medeola* with which this Pogonia often grows associated is green and glabrous, while that of Pogonia is purplish and covered with a whitish tomentum, affording a ready means of distinguishing between the two at a glance.

Clemson College, South Carolina.

A HANDSOME WILLOW OF THE PENOBSCOT VALLEY.

M. L. Fernald.

The large shrub which in the Penobscot Valley is usually supposed to be *Salix sericea* Marsh. has the young leaves conspicuously reddish-white beneath with long appressed lustrous and somewhat tangled felt-like pubescence; the mature leaves 6–12 cm. long, 2–3.5 cm. broad, velvety beneath with distinct subappressed hairs, and conspicuously serrate-dentate with salient gland-tipped teeth. The semi-ovate very glanduliferous stipules are small (4–5 mm. long) and persistent; and the slender pistillate aments are, in anthesis 2–3.5 cm. long, in fruit 4–5.5 cm. long, and borne on distinctly elongating lateral leafy branchlets.

Recently one of my students, Mr. William G. Vinal, has called my attention to certain peculiarities which distinguish the Penobscot Valley shrub from the more southern *Salix sericea*, and an examination of the material shows that in very many characteristics the two shrubs are distinct. *S. sericea*, which occurs from southern Maine to North Carolina and west to the Great Lakes and the Mississippi Basin, has the leaves silky beneath with minute close hairs, in maturity 4–10 cm. long, 1–2.5 cm. broad, closely glandular-serrulate with fine teeth. The stipules, which are rarely developed, are lanceolate, 2–3 mm. long, and caducous, usually quite absent from the mature branches; and the pistillate aments, borne on very short slightly bracteate peduncles or subsessile upon the old wood, rarely become in fruit more than 2–3 cm. long.

Besides these superficial characters which separate the two shrubs, an examination of the pistillate aments shows other characters which indicate that the shrub of the Penobscot Valley is specifically distinct from *Salix sericea*. The latter species has the style minute or quite wanting, the sericeous oblong round-tipped capsule raised on a pedicel which about equals the short-hairy scale and about twice exceeds the gland. In the shrub of central Maine the style is definite; and the looser-hairy conical capsule, though pedicelled, is nearly equalled by the very long hairs of the scale; and the gland is very minute.

The shrub of central Maine is in the shape of its capsule and its distinct style as closely related to the arctic-alpine *Salix argyrocarpa*

Anders. as to *S. sericea.* That species, however, has a finer pubescence, paler scales, smaller aments and capsules, and small entire revolute leaves without stipules.

Differing, then, in essentially all characters from the more southern *Salix sericea* with which it has been confused and the arctic-alpine *S. argyrocarpa* to which it is as closely related, the shrub of the Penobscot Valley seems worthy specific separation from those species, and it is here proposed as

Salix coactilis, sp. n. Frutex altus, ramis crassis subquadratis fusco-viridibus vel atris junioribus griseis puberulis; foliis oblongis vel lanceolato-ovatis longe acuminatis junioribus subtus dense pubescentibus, pilis rufo-albidis fulgidis coactilibus, demum subtus velutinis supra viridibus 6–12 cm. longis 2–3.5 cm. latis remote et argute glanduloso-dentatis, petiolis gracilibus 1–1.5 cm. longis griseo-velutinis; stipulis semi-ovatis glanduloso-serratis 4–5 mm. longis persistentibus; amentis foliato-pedunculatis cylindricis 2–3.5 cm. longis, fructiferis 4–5.5 cm. longis 7 mm. crassis; squamis oblongis vel obovatis apice obtusis vel rotundatis fuscis vel nigrescentibus longe pilosis, pilis laminam aequantibus; capsulis conico-subulatis 5 mm. longis albido-villosis pedicellatis, pedicello nectarium quintuplo superante; stylo distincto 0.5 mm. longo, stigmatibus brevibus bilobatis.

Large shrub with coarse stiff branches; branchlets somewhat quadrangular, dark green or blackish, the youngest gray and puberulent: leaves oblong or lance-ovate long-acuminate, slender-petioled, at first reddish-white beneath with lustrous felt-like pubescence, afterward velutinous with distinct hairs, in maturity 6–12 cm. long, 2–3.5 cm. broad, remotely and coarsely glandular-dentate; stipules semi-ovate, gland-toothed, 4–5 mm. long, persistent: aments on short leafy peduncles, expanding with the leaves, in anthesis 2–3.5 cm. long, in fruit 4–5.5 cm. long, 7 mm. thick: scales oblong or obovate, blunt or rounded at tip, dark brown to blackish, very hairy; the hairs usually as long as the blade: capsule conic-subulate, 5 mm. long, white-villous, the pedicel 1–1.5 mm. long, about five times as long as the gland: style definite, 0.5 mm. long; stigmas short, 2-lobed.— MAINE, banks of Penobscot River, Orono, in anthesis May 29 and 30, 1890 (*M. L. Fernald*); Bangor, May 16 and June 7, 1904 (*O. W. Knight*, nos. 30 [TYPE] and 31).

GRAY HERBARIUM.

NEPHRODIUM FILIX-MAS IN VERMONT.— Miss Nancy Darling of Woodstock, has had the good fortune to find in the neighboring town

of Hartland, Vermont, a station for *Nephrodium Filix-mas*. It is a new fern not only for Vermont, but for New England ; the nearest reported stations being at the eastern end of the Gaspé Peninsula, and the next nearest, in northern Michigan. In the Old World the plant is not uncommon, and for several centuries has been esteemed for certain medicinal properties. The specific name is that by which alone it was known before the binomial system of naming was adopted by Linnaeus,— "Filix mas," the male-fern, being thus distinguished from "Filix foemina," the lady-fern.

Miss Darling, at whose request this note is presented, reports that the Hartland station is some fourteen hundred feet above sea level, and nearly half a mile from any dwelling; so that the environment gives satisfactory evidence that the species is indigenous. The colony consisted of half a dozen plants in three small clumps; they were growing on rocky land, among paper birches. — EZRA BRAINERD, Middlebury, Vermont.

NOTES ON TWO SPECIES OF SPOROBOLUS.—I collected *Sporobolus asper*, Kunth, September 12, 1903, near New Haven, Connecticut. It was found on a steep, rocky slope, where it grew in scattered tufts over an area of several square rods, and amid a profusion of taller grasses, which nearly concealed even the largest tufts. On September 12, 1905, it was in full bloom, and in better condition for collection than on the corresponding date two years before, and it seemed to be more abundant. The Illustrated Flora gives Delaware as the northern limit of the species, and this station appears to be the first one reported from New England. Specimens from this station have been verified by Mr. A. S. Hitchcock at the Herbarium of the Bureau of Plant Industry in Washington. I collected *S. neglectus*, Nash, September 12, 1903, near the above locality for *S. asper*, upon a long narrow bench of rock, where the soil was thin and dry. It was abundant here. These specimens have also been verified by Mr. Hitchcock.—R. W. WOODWARD, New Haven, Connecticut.

THE VERMONT BOTANICAL CLUB held its 11th annual Winter Meeting at the University of Vermont, Burlington, January 17 and 18. Among the items of interest to students of plant distribution were the reports of the discovery of *Aspidium Filix-mas* at Harland by Miss

Nancy Darling, of *Oxalis violacea* at Dummerston by Miss A. L. Reed, and of *Rhododendron Rhodora* at Bradford by Miss A. E. Bacon. Dr. H. H. Swift showed a fine series of lantern slides from original photographs showing nearly every one of our native ferns. The officers were re-elected as follows — Pres., Ezra Brainerd, Vice Pres., C. G. Pringle, Treas., Mrs. N. F. Flynn, Secy., L. R. Jones (Burlington). It was decided to begin the publication of an annual bulletin containing a report of the winter meeting. The first number will appear in April probably. It was decided to hold the next summer meeting about the first week of July on Mt. Mansfield.— L. R. J.

Vol. 7, no. 84, including pages 245 to 286, plate 64, and title page of the volume, was issued 31 December, 1905.

Pogonia verticillata

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THE SALT-MARSH IVA OF NEW ENGLAND.

Harley Harris Bartlett.

The northern and southern forms of the plant known as *Iva frutescens* differ so widely in several points that it seems best to treat them as distinct species. The northern plant, as it occurs in Massachusetts, is a shrubby perennial from two to four feet tall, generally found on the muddy banks of tidal streams and along salt-marsh ditches. Each clump consists of from ten to a hundred or more stems from a single woody base. The individual stems are simple below the paniculate inflorescence except in very old plants, where branches may occur several nodes below the inflorescence. *Iva frutescens* as described by Small in the "Flora of the Southeastern United States" is from 1 to 3.5 meters (3–11.5 ft.) tall. No accessible specimens show the base of this large southern form, but as nearly as can be judged from herbarium material it has freely branched stems. This is probably due to the fact that in the south the small branches are not deciduous at the end of the growing season, but continue their growth from year to year.

The most noticeable difference between the two plants lies in the leaves, which are much larger and broader in the northern plant than in the southern. The stem leaves of all available specimens of both species were measured and the results expressed as ratio of length to breadth. The ratio varied from $\frac{1}{1 \cdot 75}$ to $\frac{1}{3 \cdot 6}$ (average $\frac{1}{2 \cdot 7}$) in the case of the northern plant, from $\frac{1}{4}$ to $\frac{1}{7}$ (average $\frac{1}{5}$) in the case of the southern plant. That is, the leaves of the northern plant are relatively twice as broad as those of the southern. Other significant differences lie in the heads and achenes. The head of the southern plant is about 4 mm. in diameter at maturity, whereas the head of the northern

plant measures 6 mm. if well developed. In both plants the involucre is usually of five obtuse bracts, but in case the number is not five, variation occurs in opposite directions. Occasionally the southern plant has four bracts, and the northern plant six. This same variation is found in the number of fertile flowers, which are five or four in the southern plant and five or six in the northern. Achenes of the southern plant vary from 2 to 2.4 mm. in length, with an average of 2.1 mm. Those of the northern plant vary from 3 to 3.3 mm., with an average of 3.1 mm. Strange to say, the plants which seem most intermediate between typical extremes are those from Texas, at the southern limit of range.

There can be little doubt that the name *Iva frutescens* L. must be applied to the plant of the Southeastern States. The description of the "Species Plantarum" includes a plant from Peru, which is probably some other species. The northeastern plant is here proposed as new.

Iva oraria sp. nov., fruticosa 0.5–1 m. altitudine; caulibus solum superiore parte ramosis, plus minusve subscabris; foliis plerumque oppositis, ovatis, obtusis vel acutis, profunde serratis; capitulis axillaribus deflexis pedicellatis depresso-globosis; involucro pentaphyllo vel raro hexaphyllo, ad maturitatem 6 mm. diametro; floribus fertilibus 5 aut raro 6; fructu 3–3.3 mm. longitudine.— Salt marshes, New Hampshire to New Jersey. Differs from *I. frutescens* in the larger size of the fruit, the greater diameter of the involucre, and the much broader leaves. Type, Bartlett 354 (Hb. Bartlett), collected on the banks of the Charles River, Boston, Massachusetts, 18 September, 1905.

Specimens examined:

Iva oraria: — MASSACHUSETTS: Boston, *Bartlett 354 and 408;* Boston, Aug. 19, 1853, *Wm. Boott;* Newbury, Aug. 7, 1899, *Williams;* Ipswich, *Oakes.* RHODE ISLAND: Tiverton, *Greenman 1706.* CONNECTICUT: East Haven, 1886 *A. L. Winton;* Orange, *Andrews 90.* NEW JERSEY: 1832, *Asa Gray.*

Iva frutescens L.:— NORTH CAROLINA: Southport, *Biltmore Herbarium 2585a.* FLORIDA: Titusville, *Nash 2287;* Mouth of St. John's, *Palmer 270;* Apalachicola, *Biltmore Herbarium 2585b;* Lee County, *Hitchcock 153;* Duval Co., *Curtiss 1396;* St. Augustine, *Curtiss 6457.* MISSISSIPPI: Biloxi, *Pollard 1183.* TEXAS: Galveston Id., *Tracy 7716;* Mouth of the Brazos, Aug. 1843, *Lindheimer.*

GRAY HERBARIUM.

FURTHER REMARKS ON THE COASTAL PLAIN PLANTS OF NEW ENGLAND, THEIR HISTORY AND DISTRIBUTION.

ROLAND M. HARPER.

SINCE the publication of my preliminary paper on this subject, in RHODORA last April, I have accumulated some more evidence on the same lines, which is presented herewith. At the same time I take this opportunity to correct some geographical errors which crept into the former paper. In defining the coastal plain, I unaccountably overlooked the fact that the areas of Triassic rocks along the fall-line in New Jersey, North Carolina and elsewhere are usually classed with the Piedmont region rather than with the coastal plain. Cretaceous should therefore be substituted for Mesozoic in the first paragraph.

I also failed to notice that there is one eastern state which contains neither coastal plain nor glacial drift, as far as known; namely, West Virginia. It is of considerable interest therefore to determine which if any of the plants recorded as being nearly confined to the Pleistocene formations occur in that state. Fortunately there is an excellent flora of West Virginia, by Dr. Millspaugh, published in 1892, and on referring to it I find the following items of interest. The genera *Xyris, Eriocaulon, Pontederia, Tofieldia, Sarracenia* and *Utricularia* are not mentioned in the catalogue at all, though most of them are probably represented in all the surrounding states. *Potamogeton* and *Drosera* are each represented by only one species, the former from two counties and the latter from one. Among the species enumerated in my preliminary list *Sagittaria graminea* is reported from only one county, *Dulichium* from two, *Eleocharis tuberculosa* from one, *Eriophorum Virginicum* from two, *Habenaria ciliaris* and *Rosa Carolina* from three, *Aronia arbutifolia* from four, *Polygala cruciata* from two, *Viola lanceolata* from one, *Rhexia Virginica* from seven, *Azalea viscosa* from four, and *Pieris Mariana* and *Gaylussacia dumosa* from two. But it will be noticed that I have already indicated the occurrence of nearly all of these at isolated stations in and near the mountains in the states farther south. In a later edition of his flora (1896) Dr. Millspaugh says: "There is to-day neither pond nor lake within the limits of the State." This corroborates a statement on page 76 of my former paper.

As for the age of these coastal plain species, some of them seem to be a little older than I formerly supposed. *Dulichium* has recently been reported in a fossil state from interglacial deposits in Denmark,[1] and in Dr. Knowlton's catalogue of Cretaceous and Tertiary plants of North America (Bull. 152, U. S. Geol. Surv., 1898) *Chamaecyparis*, *Brasenia*, *Drosera rotundifolia* and several existing species of *Potamogeton* are reported from Pleistocene deposits in Canada or New Jersey, and *Celthra alnifolia* and *Leucothoe racemosa* from Miocene in New Jersey. But on account of the fragmentary nature of the fossil material it is perhaps not safe to claim absolute specific identity with living plants. Dr. Hollick, who reported the two last-named species, now admits that their specific relationships are very doubtful. It is altogether likely however that some of the species mentioned in my former list are of more recent origin than others, and it may some time be possible to classify them according to age with some certainty.

The glacial-coastal plants would seem to be as a rule somewhat rare in the northern states, judging from the numerous lists of rare plants or additions to local floras which have appeared in Rhodora since its inception, several of which consist largely of just such species.[2]

The following species and genera might be added to the list of those confined to the glaciated region and coastal plain, or nearly so.

Zizania aquatica L. West to Manitoba, south to Florida, West Tennessee and Texas. Also in Asia (if it is all the same species). In the Atlantic coastal plain states this seems to be chiefly confined to brackish marshes, while in the glaciated region it is said to grow in lakes. There are some slight differences between the northern and coastal plants, which may indicate an incipient differentiation into two species.[3]

Hemicarpha micrantha (Vahl) Britton. West to Michigan and Nebraska, south to Florida, Illinois, Missouri and Mexico. (Not known in Georgia.) Also reported from the West Indies and South America, but there may possibly be more than one species involved.

Carex bullata Schk. West to Lycoming County, Pennsylvania

[1] See Hartz, Engler Bot. Jahrb. **36**: 78–81. *f.* 1–4. Feb. 28, 1905, Berry, Bot. Gaz. **39**: 232. March, 1905.

[2] For example the papers by Mr. Harger in June, 1900, Mr. Knowlton in June and October, 1900, Dr. Haberer in May and June, 1905, and Dr. Lewis in October, 1905; and my own in 1899 and 1900.

[3] See Brown & Scofield, Bull. 50, Bureau Plant Industry U. S. Dept. Agr. 1903; Scofield, Bull. 72 pt. 2. 1905.

(*Porter*) and south to Georgia (where I have collected it more than once), but with some considerable gaps in its known range.[1]

Carex albolutescens Schw. West to Pennsylvania (*Porter*) and Manitoba, south to Virginia (*Kearney*), Alabama (*Mohr*), Texas and Central America (?).[2]

Carex alata Torr. West to Michigan, south to Florida and Mississippi.[3]

Carex sterilis Willd. (*C. Atlantica* Bailey.) West to Pennsylvania, south to Florida and Mississippi.[4]

Juncus militaris Bigel. West to the Pocono region of Pennsylvania, south to Maryland.

Iris versicolor L., *Pogonia ophioglossoides* (L.) Ker, and *Limodorum tuberosum* L., common plants in the glaciated region, in Georgia seem to be strictly confined to the coastal plain and in West Virginia are each reported from only one county, but they are known from so many interior stations in other states that they are scarcely worth mentioning in this connection.

Nelumbo lutea (Willd.) Pers. West to Minnesota and Nebraska, south to Florida, Missouri and Texas.

Nymphaea (*Nuphar*). The species with floating leaves, three or four in the north and about the same number in the south, seem to be confined to the glaciated region and coastal plain, while the only one known in the Piedmont region is *N. advena*, with erect leaves.[5]

Triadenum Virginicum (L.) Raf. (*Elodes campanulata* Pursh). West to Manitoba and Nebraska (?), south to northern Florida and Louisiana.

Vaccinium Oxycoccus intermedium Gray (see Fernald, RHODORA **4**: 237. 1902). West to British Columbia, south to southeastern Virginia (*Kearney*) and northeastern North Carolina (*Croom*, Am. Jour. Sci. **26**: 316. 1834; as *Oxycoccus macrocarpus*).

Sclerolepis verticillata (Mx.) Cass. New Hampshire (*F. T. Lewis*[6]), and from New Jersey to Florida and Alabama (*Mohr*) in the coastal plain.

[1] See RHODORA **2**: 69. 1900; **3**: 51–52, 198. 1901.

[2] For notes on this species see Fernald, Proc. Am. Acad. **37**: 472–473. 1902.

[3] See Fernald, l. c., 476.

[4] See Fernald, l. c. 485.

[5] See paper by Gerrit S. Miller, Jr. in Proc. Biol. Soc. Wash. **15**: 11–13. *f.* 1. *pl.* 2. 1902, where two species are distinguished and an attempt is made to explain their distribution on climatic grounds.

[6] RHODORA **7**: 186–187. 1905.

Arnica. In Eastern North America this genus has one representative very nearly confined to the coastal plain (barely reaching the Piedmont region in extreme southeastern Pennsylvania, and ranging from there southward to Florida), while the others seem to be confined to the glaciated region.[1]

If botanists residing near the terminal moraine and the fall-line will bear these plants in mind hereafter, they can doubtless furnish us with some interesting notes on their local distribution, and at the same time discover other cases of the same kind.

The following papers should be added to the bibliography of the subject.

ADAMS, CHAS. C. The postglacial dispersal of the North American biota. Biol. Bull. 9: 53–71. 1905.

Contains references to some earlier papers by the same author which should also be consulted.

BEAL, W. J. Michigan Flora. 147 pp. Lansing, 1904.

HARSHBERGER, J. W. The comparative age of the different floristic elements of Eastern North America. Proc. Acad. Nat. Sci. Phila. **56**: 601–615. 1904.

HOLLICK, ARTHUR. Notes on Block Island [R. I.]. Ann. N. Y. Acad. Sci. **11**: 55–88. 1898.

Pages 66–70 contain an interesting discussion of the origin of the flora.

MILLSPAUGH, C. F. Preliminary catalogue of the flora of West Virginia. Bull. W. Va. Agric. Exp. Sta. **2**: 315–538. 1892.

PORTER, T. C. Flora of Pennsylvania. 362 pp. and map. 1903.

In this work the distribution of each species is given in detail, by counties, and it is readily seen that the coastal plain element of the flora is very nearly confined to the northeastern quarter of the state, which is glaciated.

UNIVERSITY, ALA.

[1] See Fernald, RHODORA 7: 146. 1905.

SOME AMERICAN REPRESENTATIVES OF ARENARIA VERNA.

M. L. Fernald.

The names *Arenaria verna* and *A. hirta* have long been familiar to American botanists, and they have been so long associated with certain alpine and high-northern plants that their American application is rarely questioned. A recent close examination of some plants of this preplexing group has convinced the writer, however, that in our interpretation of these names we have gradually wandered far from their true European significance.

In America the name *Arenaria verna* has been recently applied to high-northern caespitose and strictly glabrous plants, while most of the pubescent specimens have been assigned to var. *hirta*. All the plants thus treated have very small petals, usually shorter than the sepals or sometimes wanting. In Europe, however, the plant which is understood as *A. verna* is usually very glandular-pubescent and with very numerous comparatively showy flowers, the corolla equalling or exceeding the calyx. In these characters the true *A. verna* is obviously quite unlike the plants which ordinarily pass under that name in America; although a plant with characters as in typical *A. verna* of Europe has been found very locally at high altitudes in the Northwest, where many other European species unknown or essentially unknown in eastern America (*Phegopteris alpestris*, *Eriophorum opacum*, *Luzula glabrata*, *spadicea* and *arcuata*, *Ranunculus aquatilis*, etc.) are known to occur.

An attempt to clear the confusion surrounding the American plants which have recently been called *Arenaria verna* has led the writer to prepare the following synopsis. Two of the plants included are of closer affinity to other species than to *A. verna*, but since in America they have recently been confused with the latter species it is thought best to include them in the present notes.

* Leaves linear-subulate, 3-ribbed: sepals with 3 essentially uniform parallel ribs: seeds reddish-brown, 0.4–0.6 mm. long.

Arenaria verna L. Caespitose, *glandular-pubescent:* branches 0.4–1.5 dm. long: *panicle many-flowered: calyx equalling* or *scarcely as long as the corolla, in fruit* narrow-campanulate, 3–3.5 *mm. long;* sepals lanceolate to lance-ovate, acuminate, with narrow hyaline

margins: capsule distinctly exserted.— Mant. i. 72 (1767). *Alsine verna* Wahl. Fl. Lapp. 129 (1812); Gürke, Pl. Eur. ii. 255 (1899,) which see for detailed synonymy.— EUROPE and ASIA. Very rare in America, seen only from the Northwest. ALBERTA, Crow Nest Pass (*J. Macoun*, no. 18,273): BRITISH COLUMBIA, summit of Mt. Arrowsmith, Vancouver Island (*J. Macoun*): WASHINGTON, volcanic sand, altitude 2745 m., Mt. Rainier (*C. V. Piper*, no. 2115).

Var. **propinqua** (Richardson) comb. nov. Loosely or densely caespitose, *glandular-pubescent*, the filiform branches 2–15 cm. long, bearing usually 2 *to* 5 *flowers: fruiting calyx* 2.5–3.5 *mm. long*, the narrow-ovate hyaline-margined *sepals* short-acuminate, *usually exceeding the* oblong or narrowly obovate *petals*, and shorter than the capsule.—*A. propinqua* Richardson in Frankl. Jour. 738—reprint 10 (1823); Hook. Fl. Bor.-Am. i. 99 (1830) in part; Torr. & Gray, Fl. i. 181 (1838). *A. verna*, var. *hirta* Watson in King, Rep. 41 (1871); Porter and Coulter, Fl. Col. 14 (1874); Watson, Bibl. Index, 98 (1878) in part, and in Gray, Man. ed. 6, 86 (1890); Robinson in Gray, Syn. Fl. i. pt. 1, 246 (1897) in part. *A. verna* Britton & Brown, Ill. Fl. ii. 33, fig. 1504 (1897) in part. *A. verna*, var. *equicaulis* A. Nelson, Bull .Torr. Cl. xxvi. 352 (1899). *Alsine verna*, *η. hirta* Fenzl in Ledeb. Fl. Ross. i. 349 (1841) in part. *Alsine propinqua* Lange, Fl. Dan. xvii. 7, 8 (1877) as to Greenland plant. *Alsine verna*, var. *propinqua* Grönl. Isl. Fl. 33 (1881) as to name.—Arctic America, south to Quebec and northern Vermont, and on the higher mountains to Arizona and southern California. GREENLAND. The following specimens have been examined from eastern America. LABRADOR, near Hoffenthal (Kruth): QUEBEC, Mt. Albert, Gaspé Co. (*Allen. Collins & Fernald*); limestone detritus, Percé (*Collins, Fernald & Pease. Collins & Fernald*, no. 79. *Williams*): VERMONT, Smuggler's Notch (*Pringle et al.*).

Var. PROPINQUA, forma **epilis**, f. nov. Ubique glabra.

Like var. *propinqua* but *glabrous throughout.*—QUEBEC, limestone detritus, crest of Cap Barré, Percé, July 23, 1905 (*Collins & Fernald*, no. 80. *Williams*); crevices of serpentine, Ruisseau au Diable, Mt. Albert, August 12, 1905 (*Collins & Fernald*). Here belongs the glabrous Iceland plant illustrated in Flora Danica, xvii. t. 2903, as *Alsine propinqua.*

Var. HIRTA (Wormskj.) Watson. *Glandular-pubescent: branches* 1–5-*flowered: fruiting calyx* 4–5 *mm. long*, about equalling the capsule.—Watson in King, Rep. 41 (1871) in part, and Bibl. Index, 98 (1878) in part; Robinson in Gray, Syn. Fl. i. pt. 1, 246 (1897) in part. *A. hirta* Wormskj. in Fl. Dan. x. 6, t. 1646 (1819) excl. syn.; DC. Prodr. i. 405 (1824) excl. syn.; Cham. & Schl., Linnaea i. 56 (1826); Hook. Fl. Bor.-Am. i. 99 (1830); Torr. & Gray, Fl. i. 181 (1838). *Alsine rubella*, var. *hirta* Gürke, Pl. Eur. ii. 258 (1899), which see for further synonymy.—Arctic and subarctic EUROPE: GREENLAND: arctic

America, extending south very locally to high mountains of COLORADO, UTAH and ARIZONA.

Var. RUBELLA (Wahl.) Watson. Glabrous or slightly pubescent; the *branches* 1- (*rarely* 2-) *flowered: calyx* 3–4 *mm. long*, shorter than the capsule.—Bibl. Index, 99 (1878); Robinson in Gray, Syn. Fl. i. pt. 1, 246 (1897). *Alsine rubella* Wahl. Fl. Lapp. 128, t. 6 (1812); Gürke, Pl. Eur. ii. 258 (1899), which see for further synonymy.—Arctic and alpine EUROPE and ASIA: GREENLAND: arctic America, very locally south to the Rocky Mountains of BRITISH COLUMBIA.

* * Leaves triquetrous, one angle conspicuously stronger than the other two: sepals with one rib stronger than the others.

+- Fruiting calyx exceeding the capsule, the tips of the sepals spreading: seeds reddish-brown 0.4–0.5 mm. long.

A. ROSSII Richardson. Densely caespitose, glabrous, the very leafy branches 2–10 cm. long: leaves slightly fleshy, triquetrous (often appearing nerved), linear-subulate to linear-lanceolate, glabrous: peduncles 0.5–2 cm. long, 1- (very rarely 2-) flowered: calyx wide-spreading in anthesis, becoming short-campanulate in fruit, 3–4 mm. long; the lanceolate or lance-ovate slightly fleshy sepals subulate-tipped, usually exceeding the narrow-oblong petals, or the latter often wanting.—Richardson in Franklin, Jour. 738—reprint 10 (1823); R. Br. in Parry, 1st Voyage, App. 272 (1823); Hook. Fl. Bor.-Am. i. 100 (1830); Torr. & Gray, Fl. i. 181 (1838); Porter & Coult. Fl. Col. 14 (1874); Robinson in Gray, Syn. Fl. i. pt. 1, 246 (1897). *A. elegans* Cham. & Schl., Linnaea, i. 56 (1826). *A. stricta* Watson, Bibl. Index, 98 (1878) in part, not Michx. nor *Alsine stricta* Wahl. *A. verna* Robinson in Gray, Syn. Fl. i. pt. 1, 245 (1897) in part, not L. *Alsine Rossii* Fenzl, Verbreit. Alsin. tab. ad 18 (1833) and in Ledeb. Fl. Ross. i. 356 (1841).—Arctic Northwest America and Northeast ASIA, south in the mountains to COLORADO and OREGON. Arctic specimens have the calyx crimson-tinged, while those from southward have greenish calyces but no other apparent differences.

+- +- Fruiting calyx shorter than the capsule, the sepals with appressed-ascending tips: seeds black, 0.7–0.9 mm. long.

A. **litorea** sp. n. Laxe caespitosa; ramis rigidis glabris 0.2–1.7 dm. altis; foliis lanceolato- vel lineari-subulatis carinatis, inferioribus confertis fasciculatis, superioribus subdistantibus; panicula plerumque dichotoma pauciflora, pedicellis rigidis; calyce 3–4.5 mm. longa, sepalis anguste ovatis apice subulatis trinerviis glabris granuliferis marginibus late hyalinis; petalis anguste oblongis calyce brevioribus vel eo subaequantibus; capsulis ovoideis calyce longioribus.

Loosely caespitose, the wiry glabrous branches 0.2–1.7 dm. long, leafy only at the base: leaves lance- to linear-subulate, carinate, sub-

triquetrous, one nerve or angle more prominent than the other two, crowded at base, fasciculate, all but the uppermost exceeding the internodes: inflorescence 1–12-flowered, usually paniculate, the pedicels rigid and strongly ascending: calyx 3–4.5 mm. long; the narrow-ovate subulate-tipped sepals strongly 3-ribbed, glabrous, granular-roughened, with broad hyaline margins: petals narrowly oblong, shorter than or barely equalling the sepals: capsule ovoid, exserted. —Quebec, sandy and gravelly beach of the Baie des Chaleurs, Tracadigash Point, Carleton, July 22, 1904 (*Collins & Fernald*), July 19, 1905 (*Collins & Fernald*, no. 81. *Williams*): Ontario, shore of Lake Superior (*C. G. Loring*); Peninsula Harbor, Lake Superior, October 9, 1896 (*G. S. Miller, Jr.*). Nearest related to *A. stricta* Michx. which has the longer more bristle-like stiffer leaves extending in remote fascicles nearly or quite to the inflorescence, the petals twice as long as the sepals, which are themselves longer than the mature capsule. It is probable that Pursh's *A. juniperina* (not *A. juniperina* L.) from Newfoundland and Labrador is, judging from his description, similar to the plant of the Baie des Chaleurs.

Gray Herbariam.

NOTES ON NEW ENGLAND HEPATICAE,— IV.

Alexander W. Evans.

During the past year very few additions have been made to the hepatic flora of New England by the exploration of new localities, and most of the additions which are noted below have come to light through the study of old material. Attention is also called to several species which should apparently be reduced to synonymy. With the exception of *Frullania eboracensis* all of the species mentioned are common to Europe.

1. Lophozia excisa (Dicks.) Dumort. Recueil d'Obs. sur les Jung. 17. 1835. *Jungermannia excisa* Dicks. Pl. Crypt. Brit. **3**: 11. 1793. *J. excisa*, var. *crispata* Hook. Brit. Jung. *pl. 9.* 1816. *J. capitata* Hook. *l. c. pl. 80.* *J. intermedia* Lindenb. Nova Acta Acad. Caes. Leop. Carol. **14**, suppl.: 83. 1829. *J. intermedia*, γ *capitata* Nees, Naturgeschichte der europ. Leberm. **2**: 125. 1836. *Lophozia capitata* Macoun, Cat. Can. Pl. **7**: 18. 1902. Thorn Mt., Jackson,

New Hampshire (*A. W. E.*). In a note on *Lophozia bicrenata*[1] the writer made the statement that the true *L. excisa,* with which *L. bicrenata* has been confused in North America, had not been definitely reported from New England. The specimens recorded above, however, were already collected but through an error had been referred to another species. *L. excisa* agrees with *L. bicrenata* in its paroicous inflorescence. It is distinguished by its larger size and more delicate texture, the leaf-cells being thin-walled, except for the small trigones at the angles, instead of being uniformly thick-walled throughout. It also lacks the brownish or reddish pigmentation and the peculiar aromatic odor which are usually associated with *L. bicrenata.* In general appearance it bears considerable resemblance to small forms of *L. ventricosa.* Its paroicous inflorescence will at once separate it from this species, and it is usually easy to recognize the perigonial bracts, even after the antheridia have disappeared, by the small pocket or inflexed tooth at the antical base. In spite of the uncertainty connected with the original *J. excisa* of Dickson, most recent writers associate this name with the present plant.

2. Lophozia Muelleri (Nees) Dumort. Recueil d'Obs. sur les Jung. 17. 1835. *Jungermannia Muelleri* Nees; Lindenberg, Nova Acta Acad. Caes. Leop.-Carol. **14,** suppl.: 39. 1829. *J. acuta* Lindenb. l. c. 88 (in part). *J. Libertae* Hüben. Flora **15**: 305. 1832. *Lophozia acuta* Dumort. Recueil d'Obs. sur les Jung. 17. 1835 (in part). *J. Laurentiana* DeNot. Mem. Accad. Tor. II. **18**: 497. *f. 10.* 1859. *Lophozia Libertae* Cogn. Bull. Soc. roy. Bot. de Belgique **10**: 278. 1872. *J. bantriensis,* vars. *Muelleri* and *acuta* Lindb. Acta Soc. Sci. Fenn. **10**: 528. 1875. *J. Hornschuchiana β Muelleri* Massal. Ann. R. Ist. Bot. di Roma **3**: (8). 1888. On limestone rocks. Banks of the Housatonic River (opposite Falls Village), Salisbury, Connecticut (*A. W. E.*). Already reported from Miquelon Island, from a few stations in Canada and from Colorado, but apparently new to the eastern United States. *Lophozia Muelleri* is a member of a group of closely related species which have long been a puzzle to European hepaticologists. The group has recently been studied by Schiffner,[2] who ascribes to it the following characters: leaves always bifid; underleaves more or less developed even on slender stems; perichaetial bracts usually but little differentiated from the leaves;

[1] Rhodora **4**: 209. 1902.
[2] Verhandl. der k. k. zool.-botan. Gesellsch. in Wien **54**: 381–405. 1904.

perianth cylindrical or barrel-shaped, terete (or slightly plicate in the upper part), contracted into a tubular beak; perigonial bracts with a third dorsal tooth. Schiffner recognizes seven species, five of which have been recorded from North America. *L. Muelleri* is distinguished from its allies by its relatively small size, by its more or less acute leaf-lobes, by its rather thin-walled leaf-cells with small but distinct trigones and a minutely verruculose or striate cuticle, by its dioicous inflorescence and by its lack of gemmae. Its nearest relative is doubtless *L. heterocolpa* (Thed.) M. A. Howe, which is known in North America from Greenland, from the shores of Lake Superior, and, in the Pacific Coast region, from Yukon to California. This species is a little larger than *L. Muelleri*, the lobes of its leaves are commonly obtuse, and it produces gemmae abundantly. Among New England species *L. excisa* and *L. ventricosa* both bear some resemblance to *L. Muelleri*. These species, however, are destitute of underleaves and their perianths are widely open and dentate at the mouth. Other members of the *L. Muelleri*-group are perhaps to be expected in New England, especially in limestone districts.

3. Lophozia porphyroleuca (Nees) Schiffn. Lotos **51**: (61). 1903. *Jungermannia porphyroleuca* Nees, Naturgeschichte der europ. Leberm. **2**: 78. 1836. *J. ventricosa*, b. *porphyroleuca* Limpr.; Cohn, Krypt.-Flora von Schlesien **1**: 280. 1876. Mt. Bigelow, Maine (*J. F. Collins* and *M. L. Fernald*, *1498*, *1573*). White Mountains (*W. Oakes*). Guilford, New Hampshire (Mrs. Corter). Although this species was recorded from New England by Austin[1] many years ago, it has received but scant attention from North American writers and has usually been considered a simple synonym of *L. ventricosa*. Even in Europe it has been looked upon as a species of doubtful validity. When Arnell[2] studied the forms belonging to the *ventricosa*-group a few years ago he found that the leaf-cells in *L. porphyroleuca* had large trigones while those of *L. ventricosa* had small trigones or were thin-walled throughout. Since these differences were inconstant and he could find no others to support them, he decided that *L. porphyroleuca* was hardly worthy of specific rank. Recently, however, Schiffner has shown that other differential characters may be derived from the mouth of the perianth. In *L. porphyroleuca* this is split into numerous acute lobes; the mar-

[1] Proc. Acad. Philadelphia for 1869: 220.

[2] Bot. Not. 1890: 194. E. Bauer has published a German translation of Arnell's paper in Lotos **41**. 1893.

gins of these lobes are thickly and irregularly ciliate-dentate, some of the teeth attaining a length of three or four cells. In *L. ventricosa* the lobes are indistinct, and the marginal teeth are scattered and usually unicellular. It may be added that *L. porphyroleuca* grows on rotten wood and is commonly more or less tinged with red, while *L. ventricosa* usually grows on the ground or on rocks and is mostly dark green in color. Although reported from so few localities *L. porphyroleuca* is probably widely distributed in the mountains of New England.

4. Lophocolea heterophylla (Schrad.) Dumort. Recueil d'Obs. sur les Jung. 15. 1835. *Jungermannia heterophylla* Schrad. Jour. für die Bot. **5**: 66. 1801. *J. crocata* DeNot. Mem. Accad. Torino II. **1**: 323. *f. b, 1–4.* 1839. *Lophocolea crocata* Nees, G. L. & N. Syn. Hep. 160. 1845. *L. Macounii* Aust. Proc. Acad. Philadelphia for 1869: 223. *L. minor* Aust. Hep. Bor.-Amer. *65b.* 1873 (not Nees). *L. Austini* Lindb. Acta Soc. Sci. Fenn. **10**: 503. 1875.

Lophocolea heterophylla is one of the most widely distributed of our hepaticae, its range extending across Europe, Asia and North America. It is essentially a plant of temperate regions and is not found in the far north nor on high mountains. It is apparently absent also from the tropics, although it has been reported in North America from as far south as Louisiana. Wherever it occurs it is likely to be abundant and it is usually one of the first plants which a beginner collects.

Few species are more variable. Plants growing in the sun appear very different from those in the shade. Plants on rotting wood (the most frequent substratum) tend to be more robust than those growing on the earth. Old plants often show peculiarities which are not to be observed in young plants. In spite of this very wide range of variability it seems impossible to recognize definite groups of individuals within the limits of the species as ordinarily understood. In other words *L. heterophylla* cannot well be segregated into a group of more elementary species. A single tuft, for example, will often show all gradations between juvenile conditions and those which are associated with maturity. Even a robust individual frequently develops branches which are slender and poorly developed, and it is not unusual for a stem or branch to retain certain of its juvenile peculiarities until its growth is terminated by the appearance of archegonia.

One of the most constant characters of the species is its paroicous inflorescence, although here as in most paroicous plants a purely male

branch may occasionally be found. The variability of the species is best expressed by the leaves, the bracts and the perianths. The underleaves and bracteoles are rather more constant but still vary to a considerable extent.

On young and slender branches the leaves are distant and deeply bifid, with sharp lobes and a sharp sinus, the outline varying from rectangular to ovate, elliptical, or obovate. On more robust axes the leaves are usually broader and more or less imbricated, while the apical sinus tends to become more and more shallow, varying from acute to lunulate; on many leaves there is no sinus whatever and the apex is truncate. With these variations in the sinus the lobes show corresponding differences, tending to become blunter and blunter, and in a leaf without a sinus the lobes are represented by the obtuse or rounded upper angles of the leaf. Although the variation follows no definite order, there is a tendency for the truncate leaves to appear in the upper part of a fruiting stem. According to Howe[1] the leaf-cells vary from 24 μ to 48 μ in diameter; their walls are thin, but their trigones, although small, are usually distinct. Sometimes, however, the cells are thin-walled throughout. The margins of the leaves are commonly entire but sometimes show minute crenulations due to projecting cells.

The perigonial bracts, each with a single antheridium, are nearly always in from three to five pairs just below the two perichaetial bracts. Occasionally one of the latter also bears an antheridium. The extreme variability exhibited by the perichaetial bracts can be clearly brought by quoting published descriptions. According to Nees von Esenbeck[2] they are larger than the stem-leaves, almost erect in the lower part but squarrose above, subrectangular in outline and truncate-trilobed at the apex, the inner of the two being often more deeply incised and toothed than the other. Hübener[3] says that the bracts are denticulate on the margin and two- or three-dentate at the apex, which is squarrose or even reflexed. Limpricht[4] describes them as being long-rectangular in outline and shortly three to five lobed at the squarrose apex. Warnstorf[5] agrees pretty closely with Limpricht and describes the apex as being truncate and bluntly two or more lobed.

[1] Mem. Torrey Club **7**: 116. 1899.
[2] Naturgeschichte der europ. Leberm. **2**: 345. 1836.
[3] Hep. Germ. 148. 1834.
[4] Cohn, Krypt.-Flora von Schlesien **1**: 304. 1876.
[5] Kryptogamenfl. der Mark Brandenburg **1**: 247. 1902.

In Husnot's[1] description the bracts are said to be divided into two dentate and acute lobes, while Boulay[2] describes them as erect and emarginate at the apex or bifid and denticulate. Howe[3] ascribes to them a truncate or retuse apex, and Pearson[4] states that they are oblong-quadrate in form, undivided or obtusely emarginate at the apex, the margin being entire or bearing one or two teeth. The study of a series of specimens, either European or American, soon makes it evident that these various descriptions, although so different, are all substantially correct and that a complete characterization of the bracts should be elastic enough to include all these diverse conditions. The perigonial bracts are in many respects intermediate between the bracts just described and the leaves but show a little pocket at the antical base, which encloses the antheridium.

The perianth is terete below but sharply three-keeled above and divided for about one third its length into three distinct lobes. The lobes are plane or nearly so and represent the prolongations of the three plane faces of the perianth, which are separated by the keels. It is in these lobes that the variability of the perianth becomes manifest. They are sometimes truncate and undivided, sometimes retuse and sometimes distinctly bifid; the margin may be either entire or more or less toothed, the teeth being irregular in number, in distribution and in size. Apparently there is sometimes a correlation between strongly toothed lobes and strongly toothed bracts, but this is not always to be discerned, and it frequently happens that the lobes of a single perianth will vary among themselves.

The underleaves are deeply divided into two slender and acuminate divisions. They are either entire on the margins or bear a single tooth on one or on both sides, the lateral teeth being usually only one or two cells long. The perichaetial bracteole is usually similar to the other underleaves but is considerably larger. Sometimes, however, it is irregularly dentate or lacerate.

So far as the writer can determine after careful study, Lindberg's *Lophocolea Austini* should be considered a synonym of *L. heterophylla*. Lindberg based his species on the specimens which Austin distributed in his Hep. Bor.-Amer., *65b*, as *L. minor*. He accredits it with a

[1] Hep. Gall. 53. 1875.
[2] Musc. de la France **2**: 81. 1904.
[3] Mem. Torrey Club **7**: 117, 1899.
[4] Hep. British Isles 251. 1900.

paroicous inflorescence as in *L. heterophylla* but states that it is a smaller plant, that the leaves are all deeply lobed, the lobes and usually the sinus being acute, that the leaf-cells are only half as large and that the two primary divisions of the underleaves are equally bifid. In another place[1] he adds that the leaf-cells have trigones, that the bracts are incised and that the lobes of the perianth are strongly toothed. Unfortunately the characters drawn from the leaves and underleaves are not so definite as the description implies. Austin's material shows leaves which are retuse or undivided on plants which bear bifid leaves as well, and the lateral teeth of the underleaves, even when present, are distinctly shorter than the main divisions, this inequality being maintained even in the perichaetial bracteole. The leaf-cells, to be sure, are mostly between 21 μ and 28 μ in diameter, but it is easy to duplicate these measurements on European material of *L. heterophylla*. Of course the characters derived from the bracts and perianth are too indefinite to be relied upon.

Another plant which is apparently a form of *L. heterophylla* is *L. Macounii*. Austin records it from Canada and from New York, and it was distributed as *No. 66* of his Hep. Bor.-Amer. According to the original description *L. Macounii* is distinguished by its small size, by its crenulate leaf-margins, and by its pink underleaves with filiform divisions, each usually composed of a single row of cells. The leaves are described as varying from sharply bifid to retuse or undivided and the bracts as irregularly two to four repand-dentate. Lindberg recognizes the species and notes that the inflorescence is paroicous and that the lobes of the perianth are strongly toothed. It will be seen that these differential characters would not be of much moment even if they were constant, and an examination of Austin's specimens shows that they are subject to variation.

The European *L. crocata* was long misunderstood by writers. It is here included under *L. heterophylla* on the authority of Massalongo,[2] who examined the type-material of De Notaris. Two other doubtful species are *L. Hallii* Aust.,[3] of Illinois, and *L. profunda* Nees,[4] of Russia. Both of these species were described from sterile material, and neither has been collected a second time. So far as the descrip-

[1] Kongl. Sv. Vet. Akad. Handl. **23**[5]: 23. 1889.
[2] Ann. del. R. Ist. Bot. di Roma **3**: (9). 1888.
[3] Proc. Acad. Philadelphia for 1869: 222.
[4] Naturgeschichte der europ. Leberm. **2**: 342. 1836.

tions go they might easily be included in the cycle of *L. heterophylla*, but of course this could only be decided from the study of the types.

The reduction of *L. Austini* and *L. Macounii* to synonymy and the attempt to maintain as distinct such a species as *Marsupella media*[1] is perhaps open to criticism. It has just been shown that *L. Austini* passes into *L. heterophylla* by intergrading forms, but it seems to be also true that there are intermediate conditions between *M. media* and *M. sphacelata*. It must be further acknowledged that there is more difference between an ideal *L. Austini*, if such an expression be allowed, and an ideal *L. heterophylla* than there is between *M. media* and *M. sphacelata*. The two cases, however, are not entirely parallel. Typical specimens of *M. media* actually occur and are distinguished from typical specimens of *M. sphacelata* by slight but constant characters. In *L. heterophylla*, on the other hand, it is sometimes possible to find a whole series of gradations exhibited by a single individual.

5. Scapania dentata Dumort. Recueil d'Obs. sur les Jung. 14. 1835. *Jungermannia nemorosa*, var. *purpurascens* Hook. Brit. Jung. *pl. 21, f. 16*. 1816. *Radula dentata* Dumort. Syll. Jung. 40. 1831. *Scapania Oakesi* Aust. Bull. Torrey Club **3**: 10. 1872. *S. purpurascens* Tayl.; Pearson, Hep. British Isles 225. *pl. 90*. 1900. New Hampshire: White Mountains (*W. Oakes*); Mt. Washington (*A. W. E.*). In the writer's Preliminary List of New England Hepaticae[2] no mention is made of *Scapania Oakesi*, although this species is definitely recorded from the White Mountains in the sixth edition of Gray's Manual. The cause of the omission was the uncertainty which existed at that time in regard to the plant. Austin based his species on a somewhat uncertain character, the carinal teeth on the uppermost leaves. This character has since been found to occur in other species, so that it cannot be relied upon. The specimens which Austin distributed in his Hep. Bor.-Amer. *14*, have recently been studied by Müller, who gives the results of the examination in his valuable "Monographie der Lebermoosgattung *Scapania* Dum."[3] He finds among these specimens three distinct forms, one referable to *S. undulata*, another to *S. dentata* and the third to *S. nemorosa*, but concludes that the second probably served as the type of Austin's species, which may therefore be reduced to synonymy.

[1] Rhodora **6**: 167. 1904.
[2] Rhodora **5**: 170–173. 1903.
[3] Nova Acta Acad. Caes. Leop. Carol. **83**: 1–312. 52 pl. 1905.

The known range of *S. dentata* extends throughout nearly the whole of Europe, and it has been collected in about half a dozen widely scattered stations in North America. It has also been found in Japan. In some respects it is intermediate between *S. undulata* and *S. nemorosa*, and it has not received general recognition as a species until within the last few years. Its characters indeed are not altogether definite, and Müller includes forms under the var. *ambigua* (DeNot.) Massal., which might be referred to either *S. dentata* or *S. undulata*. Typical forms of the species are deep purple in color, and they differ from *S. undulata* and also from *S. nemorosa* in the fact that the antical lobes of the leaves scarcely arch across the stem. A full description of *S. dentata* may be found in Müller's monograph, pp. 97–115, and it is figured on plate 9.

6. Scapania gracilis (Lindb.) Kaalaas, Nyt. Mag. f. Naturv. **33**: 243. 1893. *Martinellia gracilis* Lindb. Not. Soc. F. et Fl. Fenn. **13**: 365. 1874. Beech Mountain, Mount Desert, Maine (*W. G. Farlow*). The determination of these specimens was made by Professor Farlow and afterwards confirmed by Müller. Very little is known about the distribution of this species in North America, only two other localities, Greenland and Cape Breton, having been recorded. On the eastern side of the Atlantic its known range extends from Norway to Spain, Italy and the Canary Islands, mainly along the coast. Müller considers the species to be essentially maritime. He describes and figures it in his monograph, pp. 194–201, pl. 19a. *S. gracilis* resembles *S. nemorosa* in many respects but its leaves have larger and fewer teeth and its leaf-cells have larger trigones. An even closer ally is *S. Bolanderi* Aust., of the Pacific Coast region. This species, however, is distinguished by the bunch of marginal cilia at the base of the antical lobe. Certain writers take up for *S. gracilis* the Linnaean name *resupinata*, but, as Müller shows, there is so much uncertainty as to the original application of this name that it seems advisable to discard it altogether.

7. Ptilidium pulcherrimum (Web.) Hampe, Prodr. Fl. Hercyn. 76. 1836. *Jungermannia pulcherrima* Web. Spic. Fl. Goettingensis 150. 1778. *Blepharozia pulcherrima* Lindb. Musc. Scand. 5. 1879. *Ptilidium ciliare*, var. *pulcherrimum* Warnst. Kryptogamenfl. der Mark Brandenburg **1**: 260. 1902. *P. pulcherrimum* has been recognized in Europe for a very long time, but there has always been a difference of opinion about it. By some writers it is considered a

distinct species, by others a variety or form of *P. ciliare* (L.) Nees. At the present time the first of these views is more widely held, and it is perhaps advisable for American hepaticologists to follow the example of the Europeans in this respect. At any rate the plant is distinct enough to merit their attention. *P. pulcherrimum* is distinguished from *P. ciliare* largely by a difference of habit. In *P. ciliare* the plants grow in loose tufts which are often three inches or more in depth; the individual stems are erect or nearly so and mutually support one another; they are sparingly branched, and the stem-leaves tend to be distant or only loosely imbricated. In *P. pulcherrimum*, on the other hand, which is a smaller plant, the stems are prostrate, and the plants form depressed mats which rarely attain a depth of half an inch. They are more intricately branched than in *P. ciliare*, and most of the branches, except those bearing perianths, are prostrate like the main stem, often giving a mat a stratified appearance. The stem-leaves tend to be densely imbricated. *P. ciliare* is abundant in northern and subalpine regions and becomes rarer toward the south. It grows on the earth or more rarely on rocks. *P. pulcherrimum* is more southern in its distribution but also occurs in cool localities. It commonly grows on logs or on trees, more rarely on rocks and apparently never on the earth. When well-developed there is usually no trouble in separating the two plants at a glance. Poorly developed or immature specimens are, however, sometimes indeterminable. The microscopic characters separating the plants are less definite than the macroscopic and are purely relative in their nature. In both species the divisions of the leaves and underleaves bear marginal cilia, but these are less numerous in *P. ciliare* than in *P. pulcherrimum*.

The following stations, quoted from the Yale herbarium, will give some indication of the distribution of these two species in New England, but both have doubtless been collected in many other localities:—

P. pulcherrimum. Maine: Moose River (*L. B. Tuckerman*); Owls Head Mountain, Buckfield, Oxford Co. (*J. A. Allen*); Orono (*E. D. Merrill*); Mt. Katahdin (*Cowles Party, 1, 8, 9, 16*); Mt. Kineo, Mt. Bigelow, and Carratunk (*J. F. Collins, 1758, 1518, 1563, 1484, 1771, 1775*). New Hampshire: Shelburne (*D. C. Eaton*); Cornish (*Miss Haynes*). Vermont: Leffert's Mills and Mt. Killington (*C. M. Cooke, Jr.*). Massachusetts: Deerfield (*Emmons*); West Newbury (*Miss Haynes*). Connecticut: Woodbridge, Hamden, Bethany, and Meriden (*D. C. Eaton*); Westville, North Haven, Seymour, and Salisbury (*A. W. E.*).

P. ciliare. Maine: Mount Desert (*D. C. Eaton*); Mt. Katahdin (*J. F. Collins, 2283*; *Cowles Party, 5, 13, 21, 28, 30, 31*); Mt. Bigelow (*J. F. Collins, 1489, 1569*). New Hampshire: Mt. Washington (*D. C. Eaton, A. W. E.*); Carter Dome (*A. W. E.*). Vermont: Jericho and Mt. Mansfield (*A. W. E.*). Massachusetts: Malden (*E. Faxon*). Connecticut: East Haven (*A. W. E.*).

8. Frullania eboracensis Gottsche; Lehmann, Pug. Plant. **8**: 14. 1844. *F. virginica* Gottsche l. c. 19. In the writer's "Revision of the North American Species of *Frullania*,"[1] *F. virginica* is recognized as a distinct species, although it is acknowledged that it cannot be well separated from *F. eboracensis* in a sterile condition. The differential characters which are there relied upon are drawn from the perianths. In *F. eboracensis* these are described as smooth and destitute of supplementary ridges, while in *F. virginica* they are said to be tuberculate and provided with several supplementary ridges. Even these differences are admitted somewhat tentatively, and the statement is made that there is occasionally a trace of an antical keel in *F. eboracensis.* The study of a wide series of specimens has since made it evident that the perianth in *F. eboracensis* is much less constant in its characters than had been supposed and that it not infrequently shows a tuberculate surface and also supplementary ridges. In fact a single specimen will often show gradations between a perianth of this type and a smooth perianth. In view of these facts it seems necessary to reduce *F. virginica* to synonymy and to consider it one of the many forms of *F. eboracensis.* Understood in this broad sense the species now includes seven forms of *Frullania* which have been described as distinct species by various authors. It is exceedingly common in eastern North America and has been collected in each of the New England states.

In addition to the species noted in the preceding pages, *Cephalozia connivens* and *Chiloscyphus pallescens* may be recorded from Cumberland, Maine. The specimens were collected by E. B. Chamberlain and kindly communicated by Miss Haynes. The following species may also be recorded from Rhode Island: *Kantia Sullivantii*, Middletown (*A. W. E.*); *Lophozia bicrenata*, North Kingston (*A. W. E.*); *Odontoschisma prostratum*, Middletown (*A. W. E.*). The Maine record for *Metzgeria conjugata* and the Rhode Island record for

[1] Trans. Conn. Acad. **10**: 1–39. pl. 1–15. 1897.

Jamesoniella autumnalis, which are marked in the Preliminary List with the sign "—," may now be marked with the sign "+." The Maine record for *Jungermannia pumila*, however, seems to have been based on an incorrect determination and ought to be stricken out.

Making the additions and subtractions as indicated above, the census of New England Hepaticae would stand as follows: Total number of species recorded, 135; number recorded from Maine, 83; from New Hampshire, 103; from Vermont, 81; from Massachusetts, 80; from Rhode Island, 64; from Connecticut, 96; from each of the six states, 35.

Yale University.

TWO VARIATIONS OF CAREX GLAREOSA.

M. L. Fernald.

One of the most characteristic sedges of brackish shores of the Gulf of St. Lawrence and of the broad estuary of the River is a small caespitose plant which ordinarily passes as *Carex glareosa* Wahlenb. There, in eastern Quebec and New Brunswick, the ordinary phase of the plant agrees with most of the arctic material and that of Scandinavia in having plump plano-convex broadly ellipsoid, ovoid or obovoid perigynia which usually taper abruptly to the short beak. A variation of the plant which is less common, and known to the writer only from Cacouna and Bic on the River St. Lawrence differs constantly in having fusiform perigynia which taper gradually to each end. Aside from the plants of Cacouna and Bic the only specimens in the Gray Herbarium with such narrow perigynia are two sheets from Sweden and one from Finland.

As these two phases of *Carex glareosa* occur in eastern Canada, they are well marked and very constant extremes, each occupying by itself large areas of brackish sandy or gravelly shore. At Cacouna and at Bic the plant with slender perigynia alone has been found, while at Rivière du Loup, Dalhousie, Escuminac, Bonne Espérance, and at numerous other places, the plant with short ovoid or obovoid perigynia appears to be the sole representative of the species.

As already intimated, this broad-fruited plant is generally much better known than the other, and as shown by herbarium-specimens

it is the plant of Greenland, Alaska, the Behring Sea region, and of Spitzbergen and much of the Scandinavian and Finnish coast. In fact, the narrow-fruited plant is apparently so local that in most modern accounts of *Carex glareosa* it has received little or no recognition. Thus in Flora Danica, in 1865, the plant is described with perigynium "oblongo-ovali"[1] and in the beautiful colored plate the perigynium is shown three-fifths as broad as long. In Boott's Illustrations, in 1867, the plate[2] agrees with that in Flora Danica in showing as *C. glareosa* the plant with ovoid perigynia; and in Otsenfeld's Flora Arctica, in 1902, the plant is said to have the "utricles ovate,"[3] and the figure shows the utricle (perigynium) more than half as broad as long.

When, however, we compare with this commoner tendency of *Carex glareosa* the original description[4] and figure[5] of the species, we find that Wahlenberg's plant was not the form with ovoid perigynia so generally treated as *C. glareosa*, but the narrow-fruited and ordinarily less common plant. The original "capsulis oblongis acuminatis" indicates this, and the evidence is strengthened by the colored plate in Schkuhr, which shows a perigynium only one-third as broad as long; and the fact that both the Swedish specimens in the Gray Herbarium come from the Gulf of Bothnia, one from Bygdeå in Westerbotten and the other from the same region (the old district of Norrland) is at least a good indication that Schkuhr's beautiful illustration represents a characteristic plant of that coast.

From their manner of occurrence in eastern Canada, the two extremes seem clearly distinct, but since they apparently have no other distinguishing characters than the shape of their perigynia, they should be treated only as varieties of one species. These with their distribution as known to the writer may be summarized as follows:

Carex glareosa Wahlenb. Plant densely caespitose, weak and lax, the usually curved culms nearly filiform: leaves blue-green, flaccid, 0.5–1.5 mm. broad, plicate or involute: spikes 2 to 4, subapproximate, appressed-ascending, obovoid; the lower 4–9 mm. long, 2.5–4 mm.

[1] Fl. Dan. xiv. t. 2430 (1865).
[2] Boott, Ill. iv. t. 494 (1867).
[3] Ostenfeld, Fl. Arct. 58, fig. 28 (1902).
[4] "*C. glareosa*: spiculis ternis terminali basi mascula subconfertis oblongis, squamis aequantibus, capsulis oblongis acuminatis convexissimo-planis subacutangulis nervosis; foliis angustissimis intimo multum breviore, culmo flaccido. *C. glareosa mihi* Schkuhr; Car. tab. Aaa. fig. 97. *Hab.* in littoribus marinis glareosis Norvegiae septentrionalis, & ad Sinum Bottnicum." — Wahlenb. Act Holm. xxiv. 146 (1803)
[5] Schkuhr, Riedgr. Nachtr. 24, t. Aaa, fig. 97 (1806).

thick; the terminal larger, including the staminate base 6–11 mm. long: perigynia pale brown or drab, plano-convex, fusiform, tapering very gradually to the smooth beak and the shorter substipitate base, prominently striate-nerved, 2.5–3 mm. long, barely 1 mm. broad, distinctly exceeding the acutish or obtuse ferrugineous or purplish white-edged scales.— Act. Holm. xxiv. 146 (1803), and in Schkuhr, Riedgr. Nachtr. 24, t. Aaa, fig. 97 (1806).— Very local on wet gravelly or sandy sea-shores, NORWAY, SWEDEN and FINLAND: QUEBEC, damp brackish spots, Bic (*Collins & Fernald*); forming turf in brackish soil by the St. Lawrence, Cacouna (*Collins & Fernald*, no. 41, *Williams*).

Var. **amphigena**, var. nov. Perigyniis late ellipsoideis ovoideis vel obovoideis 2–3 mm. longis 1.3–1.9 mm. latis fere abrupte rostratis.— *Type*, salt-marsh, Escuminac Bay, Escuminac, Bonaventure Co., QUEBEC, June 29, 1904 (*M. L. Fernald*). Examined also from the following stations. LABRADOR, Turnavik Island, August 12, 1896 (*Cornell Party*): QUEBEC, maritime rocks, Bonne Espérance, July 26, 1882 (*J. A. Allen*); crevices of rocks, Watsheeshoo, July, 1882 (*St. Cyr*); Pointe des Monts, June 16, 1862 (*J. Bell*), rocks on coast, Grand Etang, August 1, 1882 (*J. Macoun*); Rivière du Loup, August 4, 1902 (*Williams & Fernald*): NEW BRUNSWICK, low damp spots, Dalhousie, July 4, 1904, (*Fernald*): ALASKA, Shumagin Island, July 15, 1872 (*M. W. Harrington*); Nunivak Island, August 8, 1891 (*J. M. Macoun*): BEHRING STRAITS, Arakamtchetchene Island, 1853–56 (*C. Wright*): GREENLAND, Jacobshavn (*J. Vahl*); Godhavn, 1870 (*Berggren*); Disco, July 24, 1902 (*Porsild*, no. 308): NORWAY, salt-marsh at mouth of River Altenelf, Elvebakka, July 6, 1868 (*Zetterstedt*): SWEDEN, Vesterbotten (*Lehmann*); Hernösand and Gefle (*J. Franzen & K. F. Thedenius*): RUSSIA, Kola, June 26, 1883 (*Hollmén*); Federersk, July, 1885 (*V. F. Brotherus*); Vasa, July, 1880 (*V. F. Brotherus*), June 16, 1884 (W. Laurén); Borgå, June 15, 1884 (*K. J. W. Unonius*).— This is *C. glareosa* of most authors, and is well illustrated in Flora Danica, xiv. t. 2430 (1865); Boott's Illustrations, iv. t. 494 (1867); and in Ostenfeld's Flora Arctica, 58, fig. 28 (1902).

GRAY HERBARIUM.

AN EXTREME FORM OF BOTRYCHIUM VIRGINIANUM.— In June, 1905, while attending a field meeting of the Connecticut Botanical

Society, I collected at Lakeville, Connecticut, an unusual plant of *Botrychium Virginianum*, Sw. It is tall (two feet three inches) and stout in proportion. Just above the sterile segment of the frond the stem forks twice and each of the three resultant branches bears a large, perfectly developed, and heavily fruited fertile segment,— in every case about four and a half inches in height and with the lowest pinnae two to two and a half inches long. In other respects the plant is normal, though rather large for the species, and it grew in a patch of woods under seemingly normal conditions. Only in its three heads is the strength of its individuality apparent.

Mr. C. H. Bissell informs me that in D. C. Eaton's herbarium at Yale there are two specimens of *Botrychium Virginianum* which have three fertile segments, and several others which have two. The form, then, is by no means unprecedented, but its occasional recurrence may be worthy of note.— C. A. Weatherby, East Hartford, Connecticut.

Early Flowering of Hepatica triloba.— Writing to Professor G. L. Goodale, Mr. Denison R. Slade of Chestnut Hill, Massachusetts, sends the following note. "I wish to let you know that I found the Hepatica in full bloom in the woods of Newton [Massachusetts] on January 29, 1906. My father for a term of years, 1863 to 1895, kept a record of the dates when the above flower appeared in the same place. March 2, 1880, is the earliest at which it was found. He writes 'I once found them in blossom in Mount Auburn in March, 1846, but they rarely show themselves about Boston before the month of April.'"

Vol. 8, no. 85, including pages 1 to 24, and plate 64, was issued 7 February, 1906.

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HYBRIDISM IN THE GENUS VIOLA. — III.

(Plates 66–70.)

EZRA BRAINERD.

It is convenient to have some simple rule to determine the order in which the parent species shall be given in naming a hybrid; on the whole the alphabetical order adopted by the Old World botanists has most to recommend it. The eight hybrids discussed in RHODORA, vi. 213–223, thus amended, are as follows: —

1. VIOLA FIMBRIATULA × SEPTENTRIONALIS.
2. V. CUCULLATA × FIMBRIATULA.
3. V. FIMBRIATULA × SORORIA.
4. V. AFFINIS × SEPTENTRIONALIS.
5. V. CUCULLATA × SEPTENTRIONALIS.
6. V. SEPTENTRIONALIS × SORORIA.
7. V. AFFINIS × SORORIA.
8. V. CUCULLATA × SORORIA.

I would first add to this list three other Vermont hybrids,— the three possible combinations of *V. affinis*, *V. cucullata* and *V. nephrophylla*. A group of three thus interrelated we may speak of as a triad.

9. V. AFFINIS × CUCULLATA.—This differs from *V. affinis* in having larger leaves, in having a dark-blue ring around the center of the open corolla, in having long slender apetalous flowers, and in having long-auricled sepals; in these four respects it approaches *V. cucullata*. It differs from *V. cucullata* in having subacuminate leaves, in having purplish petals, in having a somewhat bearded spurred petal, and in having cleistogamous capsules dotted with brown; and in these four

respects it approaches *V. affinis*. It has all the characters common to the two parents — except fertility. One plant of this was found with the parents in an alder thicket along the Otter Creek in Middlebury in the spring of 1903, and has since been grown in the garden. It has spontaneously produced four seedlings quite like itself. It was not reported in November 1904, as it was a single instance, and the flowers had not been sufficiently studied. After watching it through the past season I have no further doubt regarding its origin.

10. V. AFFINIS × NEPHROPHYLLA.— Leaves and sepals noticeably less obtuse than in *V. nephrophylla*, even somewhat acuminate; capsules of cleistogamous flowers green speckled with brown, often with only withered ovules, rarely with over eight per cent fertilized. Numerous plants, growing with parent species, east shore of Providence Island, Lake Champlain.— The Vermont Botanical Club on its summer outing the last fourth of July visited this island, and found in the crevices of fractured limestone, below the high-water line, an abundance of *V. nephrophylla*. A little further back along a fringe of trees I collected a large clump of a strange violet, which I examined carefully only on my return home. Its sterility and unfamiliar aspect indicated a hybrid; its glabrous herbage, small ovoid cleistogamous flowers, and brown-dotted capsules could be accounted for only by assuming *V. affinis* as one of the parents. On July 22nd I revisited the station, found many other specimens of the hybrid, and *V. affinis* growing but a few feet away. Two hours' search on the island failed to disclose any other than these two species of blue stemless violet; I therefore venture to name it as above, though the petaliferous flowers are unknown.

11. V. CUCULLATA × NEPHROPHYLLA.— Quite intermediate between the parent species in those particulars in which they differ; especially in the length of the cleistogamous flowers and of the auricles of the sepals, characters in which the two species are in extreme contrast.— In September, 1904, eight or ten plants of *V. nephrophylla* were transferred to the garden from the borders of a cold brook running through Judge Munson's farm in Manchester, Vermont. When they flowered last spring, one of these plants was taller than the rest, more cespitose, had less obtuse leaves, and bore smaller flowers on longer peduncles. A few days later I revisited the Manchester station, and found occasionally similar plants, especially where in wetter places colonies of *V. cucullata* bordered those of *V. nephrophylla*. At

Arlington, twelve miles further south, in a boggy meadow where the two species grew together, I succeeded in finding another of these odd forms, seemingly a *V. cucullata* with violet flowers and bearded spur-petal. This Arlington plant was transferred to the garden, and this as well as the Manchester plant, as they developed through the summer, fully confirmed my suspicion as to their hybrid origin. They were both luxuriant and bore numerous cleistogamous flowers, that proved to be nearly sterile; I succeeded in getting only nine seeds for an experiment in sowing.

In the six following hybrids the parent species all belong to the *sagittata-cucullata* group, whose cleistogamous flowers are borne on erect peduncles and produce oblong green capsules clad with lanceolate long-auricled sepals. The species are all glabrous except *V. fimbriatula;* and all that occur in the eastern States have violet-purple flowers with a bearded spur-petal, except *V. cucullata*. They differ widely, however, in leaf outline, and thus have conspicuous characters that led to the early recognition of the five species, and that have also recently attracted attention to most of the intermediate forms resulting from hybridization.

12. V. SAGITTATA × SEPTEMLOBA.— This striking hybrid is figured in plate 66, a & b. It was collected by Mr. H. D. House at Hyattsville, Md., May 1 & June 8, 1905, growing with the parent species, and was recognized by him as a hybrid. I also regard as the same a plant in the Herbarium of the New York Botanical Garden, collected by Dr. Britton at Oakwood, Staten Island, N. Y., Sept., 1897, and labeled "*V. emarginata*." It shows several quite sterile capsules, and its vegetative vigor is indicated by the added note, "plant one foot in diameter." Also in the National Herbarium is a specimen with leaves quite like those of the Hyattsville plant, collected by Wm. S. Davis, New Dorp, Staten Island, July 29, 1889, and labeled "*V. sagittata*."

13. V. FIMBRIATULA × SEPTEMLOBA.— This was published as *V. Mulfordae* by Mr. C. L. Pollard (Proc. Biol. Soc. Wash., xv. 203.) and based on specimens collected by Miss F. A. Mulford at Hempstead Plains, Long Island, N. Y., May 13, 1902. Through the kindness of Miss Mulford, I received in September, 1904, ten or twelve plants of her violet, which have been under observation in the garden during the past season. They had the usual vigorous growth of hy-

brids, and produced numerous cleistogamous flowers, most of which, however, were quite sterile, turning yellow after a few weeks; in those that produced seeds the average number was 4⅝. The intermediate character of the foliage is shown in plate 67 (fig. a) from a plant in cultivation September 13. The leaves of the parent species (figures b & c) are from herbarium specimens of plants growing with the hybrid and collected by Miss Mulford. Mixed with the live plants sent by her in September, 1904, were also five plants of *V. septemloba* and one of *V. fimbriatula*, showing that the three forms grew in close proximity to each other.

14. V. CUCULLATA × SAGITTATA.— I would so dispose of the colony of plants discovered by Mr. Witmer Stone, and described as *V. emarginata* (Tinicum, Pa., April 25 & June 21, 1903, Proc. Acad. Phila., 1903, p. 685). Last August I visited with him this station; the particular colony seen two years before had disappeared in a dense growth of briars and sprouts, after a recent chopping; but about 200 meters away a plant was found quite like those formerly collected, growing with what I regard as the parent species. These plants differ from the ordinary *V. emarginata* in having blue, not violet, petals (Mr. Stone says "between campanula blue and mauve of Ridgway"), in having on the spurred petal "scattered hairs" rather than a dense beard, and in having leaves with sharper coarser teeth at the base. The last character suggests *V. sagittata;* the two others, *V. cucullata.* The cleistogamous flowers in the August plant are also decidedly like those of the latter species, and the contour of the leaf is a fair compromise. The specimens of both collections show impaired fertility.

15. V. CUCULLATA × SEPTEMLOBA.— (*V. Brittoniana* × *cucullata*, House, Torr. Bull. xxxii. 255, pl. 17. *V. notabilis*, Bicknell, Torreya, iv. 131). I have had a specimen from Milltown, N. J., growing in the garden since June, 1904, and visited the station in August of that year. Mr. Bicknell's exact description and Mr. House's excellent drawing leave but little to be added. Mr. Stone also (l. c., p. 680) collected it at Springdale, N. J. in 1903, and surmised it then to be the hybrid here indicated. I place here also specimens of Mr. E. S. Steele, Berwyn, Md., May 15, 1902; and of Prof. Greene, Stony Run, Md., April 30, 1898.

16. V. CUCULLATA × (?) EMARGINATA.— This is probably the disposition to be made of Mr. Bicknell's *V. lavandulacea* (Torreya, iv. 130). The beautiful specimens sent me were collected at three

different dates in May, and were to me a puzzle until I saw last September a fine plant in the garden at Bronx Park. This was completely sterile; though there were fifty or more cleistogamous fruits, not a seed could be found. Its relationship to *V. cucullata* is evident, as Mr. Bicknell observes; its somewhat short and beardless spurred petal and elongated peduncles indicate this. The color of the petals, "pale lilac to lavender blue," is a modification in the direction of *V. emarginata.* The contour of the leaf and its slight pubescence is just such a compromise as might be expected from the union of *V. cucullata* with a modified form of *V. emarginata* like that described below (no. 29, B). Further study another season of the living plant may lead to more certain conclusions.

17. V. EMARGINATA × SEPTEMLOBA.— Aestival leaves simulating those of *V. palmata*, but quite glabrous; truncate at base or shallowly cordate; middle lobe disposed to be narrowly deltoid; autumnal and earliest vernal leaves but slightly incised; cleistogamous flowers on erect peduncles, producing green capsules 8–12 mm. long. The average number of seeds in 28 capsules was 14.36, showing about 80 per cent of unfertilized ovules.— Two good plates of this, drawn by Mr. Theo. Holm, are to be seen in Pittonia iii, pl. vii & viii. On page 256 Prof. Greene disposes of the plant as a "cut-leaved form" of *V. emarginata*, growing with the typical form that has "uncut trigonous foliage." I am under great obligation to Mr. Holm for a dozen live plants of these forms from Brookland, D. C., that I have grown for over a year; the hybrid shows remarkable vigor. Mr. House collected the same thing at Hyattsville, Md., June 4, 1905, no. 937. Mr. Witmer Stone also has it from Tuckahoe, Cape May, N. J., growing with both parents, Aug. 25, 1901 (Proc. Acad. Phila., Oct., 1903, pl. xxxvi, fig. v.); also *A. A. Heller*, near Beartown, Pa., June 8, 1901.

I pass next to speak briefly of eight hybrids between species of the *sagittata-cucullata* subgroup and those of the *affinis-palmata* subgroup. The latter have ovoid short-auricled cleistogamous flowers, on decumbent peduncles, and the capsules are usually reddish brown.

18. V. FIMBRIATULA × PALMATA Robinson in hb.— Aestival leaves ovate-oblong in general outline, acute or pointed, with one to three incised lobes on either side below the middle, clothed with minute soft pubescence; cleistogamous flowers intermediate between those of parent species; capsules somewhat dotted with brown, infertile.

"Crevices of rocks in open woods with parent forms," Granny Hill, Lexington, Mass., Sept. 20, 1903, *Robinson & Greenman*. Dr. Robinson first recognized and called my attention to this hybrid; last spring Dr. Greenman kindly procured for me about twenty living plants; I visited the station in August. The leaves vary considerably in relative width and in lobation, as do those of *V. palmata*; and those produced in late summer and autumn are often uncut or slightly lobed, as though anticipating the earliest vernal leaves. Additional stations are: "pastures," Portsmouth, N. H., July 15, 1894, *Charles A. Davis;* "moist woods under pines," Kensington, N. H., July 2, 1899, *A. A. Eaton;* Niles Place, Ledyard, Conn., June 24, 1900, *Mrs. C. B. Graves;* East Lyme, Conn., 1904 & 1905, several colonies, *Miss A. M. Ryan*. (See pl. 70.)

19. V. fimbriatula × papilionacea.—(*V. papilionacea aberrans* Stone, l. c., p. 683, pl. xxxvii, fig. 4-6). This is hardly distinguishable from hybrid no. 3 (Rhodora, vi. 215). *V. sororia* is separated from *V. papilionacea* chiefly by pubescence; but both hybrids inherit pubescence from *V. fimbriatula*, and the other parent must be determined chiefly from its presence with the hybrid. No. 19 seems to occur frequently along the Atlantic border.

20. V. palmata × sagittata. – Differs from *V. sagittata* in having wider pubescent leaves, more or less lobed near the middle, in having cleistogamous flowers with appressed ciliate auricles, and in having a brown-spotted summer capsule on much shorter peduncles. It differs from *V. palmata*, var. *dilatata* in having ovate-oblong leaves with coarsely toothed or incised basal lobes, and in having long slender cleistogamous flowers on ascending peduncles. In each case the departure is in the direction of qualities possessed by the other parent. The autumn leaves are cordate and uncut; capsules few-seeded — nineteen in the four capsules examined; both parent species near by. — This hybrid was collected by Mr. House in May and June, 1904, near New Brunswick, N. J., nos. 39, 53, 68. I have had a specimen in the garden since June 15, 1904, and have twice visited the station. I place here also two specimens in the Gray Herbarium: Centreville, Del., May 19, 1877 and Oct. 27, 1878, *A. Commons;* near Garrison's, N. Y., May, 1886, *Ed. S. Denton*. The last has a more deeply cut leaf than the two others, as though from typical *V. palmata;* Dr. Gray has written on the sheet "V. palmata, L toward sagittata."

21. V. papilionacea × sagittata.— Not unlike the last described

hybrid, but quite glabrous and without lobes. Ivy Hill Cemetery, Philadelphia (June, 1905, Mr. Stone sent living plants now in garden). Sept. 6, 1905, *Stone & Brainerd*; along railway near Lester Sta., Tinicum, Pa., Sept. 6, 1905, *Stone & Brainerd*; near New Brunswick, N. J., Sept. 7, 1905, with both parents, *Brainerd*; Curtis Street, Southington, Conn., May 28, 1899, *C. H. Bissell*, named by Mr. Pollard, "*V. sagittata*, rank development"; roadside, East Lyme, Conn., Aug. 29, 1905, *Miss A. M. Ryan*.— The rank cespitose growth of the hybrid is shown by the fact that eleven ample specimens were made from one of the New Brunswick plants. In four capsules of the Ivy Hill plant the number of seeds averaged 29; the plants from the other stations are less fertile. The capsules of the Ivy Hill plants are nearly green in color, those of New Brunswick brown-spotted; but the capsules of *V. papilionacea* at these two stations differ in like manner.

22. V. AFFINIS × SAGITTATA.— Leaves narrowly deltoid, the upper half minutely and distantly serrate, the basal lobes rounded and coarsely toothed, forming a broad sinus; cleistogamous flowers and fruit intermediate. From two stations: Patuxent, Md., June 4, 1905, *H. D. House*, no. 972; Tinicum, Pa., Sept. 6, 1905, *Stone & Brainerd*.— With the Patuxent specimen was mixed a plant of *V. affinis*, the form with minutely pubescent capsules; it was interesting to see that the capsule of the hybrid had also this mark, which is not found in any other species of our blue stemless violets. The Tinicum plant was discovered at Mr. Stone's station for *V. crenulata*, Greene, a phase of *V. affinis* found in open bogs; and *V. sagittata* grew at no great distance.

23. V. PALMATA × SEPTEMLOBA.— Differs from *V. septemloba* in the direction of *V. palmata*, in its large less divided leaves with broad middle lobe, in pedicels one half as long, in bearing pubescence on petiole and veins of leaf, and in having summer capsule dotted with brown; differs from *V. palmata* in the direction of *V. septemloba*, in being less pubescent, in producing slim long-auricled cleistogamous flowers on ascending pedicels, in having nearly green cleistogamous capsules.— Discovered at Milltown, N. J., by Mr. House in June, 1904. A live plant sent at that time has attained to a large size in the garden. About one fifth of the ovules mature into seeds; the leaves in late summer become ranker and less divided.— In March, 1904, I noticed in the National Museum two sheets of what seemed to be this hybrid from Stratford, Conn., May 24, 1893, *E. H. Eames*. The

specimens are nearly glabrous, except one smaller plant — good *V. palmata*. Dr. Eames writes that he remembers the plant as "a connecting link between *V. palmata* and *V. Atlantica*" (*V. septemloba*), both of which grew there. He adds, "I avoided the intermediates in order to have something I could name." The station has been much disturbed, but I trust that these "avoided" plants may yet be rediscovered.

24. V. CUCULLATA × PALMATA.— Among the living plants sent by Dr. Greenman from Granny Hill, Lexington, was one that, as it developed during the past summer, I could account for only in this way. It was extremely sterile, but produced numerous slender cleistogamous flowers, like those of *V. cucullata* × *sororia* (no. 8). The leaves were somewhat three-lobed, the *V. palmata* present being the "var. *dilatata*." On visiting the station, I observed, perhaps 100 meters away, in a marshy meadow at the base of the hill, plants of *V. cucullata*. Miss A. M. Ryan the past summer found the same hybrid in several places in East Lyme, Conn.

25. V. CUCULLATA × PAPILIONACEA.— Much like the last and no. 8 in its sterile subulate cleistogamous flowers, that are usually tinged with brown; but different from both in being quite glabrous and from no. 24 in showing no trace of lobes.— Southington, Conn., transplanted to garden by *C. H. Bissell*, seen by me Aug. 22, 1905; East Lyme, Conn., 1905, *Miss A. M. Ryan*. Its luxuriant growth in cultivation one season was such that from one plant twenty large specimens were made by Miss Ryan for distribution. Found also in a low woods on the line between New York and Yonkers, Sept. 8, 1905, *Eggleston & Brainerd*.

Two hybrids of *V. villosa* with closely related species should be here noticed.

26. V. PALMATA × VILLOSA.— Looks like small plants of *V. palmata*, var. *dilatata* with the silvery pubescence of *V. villosa* on the upper surface of the leaves.— I am indebted to Mr. House for the recognition of this hybrid: Milltown, N. J., June 19, 1904; Darlecarlia Reservoir, D. C., June 17, 1905, no. 1030; Rock Creek Park, D. C., May 13, 1905, no. 712. The same thing occurs at Ivy Hill Cemetery, Philadelphia, and was pointed out to me by Mr. Stone last September.

27. V. AFFINIS × VILLOSA.— Much of what Mr. Stone, (l. c., p.

674,) has included under *V. villosa cordifolia* seems to be this. Both supposed parents were abundant in 1903 at the Sherwood station in a dry woodland; but the trees have since been cut.

It remains to speak of several cases in which unlike forms are produced by the crossing of two doubtfully distinct species.

28. V. FIMBRIATULA × SAGITTATA.— The most conspicuous distinctions between these two species are found in the foliage. They may be thus stated: pure *V. sagittata* has narrower leaves, dilated and incised basal lobes, longer petioles, and is glabrous; (cf. fig. c of pl. 66 with fig. c of pl. 67). The progeny of the cross instead of presenting a halfway state between these divergent characters, is often quite like one parent in some of these features and quite like the other parent in other features. Thus in this particular cross we have four groups of forms:

A. The breadth of leaf of *V. fimbriatula* and the glabrous surface of *V. sagittata.* (See pl. 68, fig. c.)
B. The leaf-outline of *V. sagittata* and the pubescence of *V. fimbriatula.* (Fig. d.)
C. A compromise in leaf-outline, forming a deltoid leaf, either with incised lobes at the base (fig. a.), or without (fig. e.), and with either much or little pubescence.
D. The lower half of the leaf may be broad and the upper half abruptly narrowed (fig. b.), and this either with incised lobes at the base or without, and with a varying amount of pubescence.

In this plate only a few of the variant forms are given. One needs to visit a station where hundreds of specimens can be seen to appreciate this tendency to sport. A fine station for this was discovered by Miss Ryan, on the north side of a railway embarkment across a salt marsh, at Giant's Neck, East Lyme, Conn. The plants, or their seeds, were evidently brought there with the soil, and no other violets were found there. Other stations are: "Gristmill Park," Plainville, Conn., *Luman Andrews,* 1904; Blue Hill Reservation, Milton, Mass., *H. A. Purdie;* Lindenau, near New Brunswick, N. J., *H. D. House.* — Various forms have been seen from other stations, but I have visited only the four above named. In all these forms there is little or no impaired fertility.

29. V. EMARGINATA × FIMBRIATULA.— Here we have a similar

case, though of rarer occurrence. In September, 1904, I received from Mr. Theo. Holm a package of about fifteen live plants, which he called the Washington form of *V. fimbriatula.* As they developed during the past summer, they all manifested a mixture of the characters of *V. emarginata* and *V. fimbriatula,* and yet could be easily marked off into four classes, as follows:

A. Leaves somewhat deltoid as in *V. emarginata,* quite coarsely toothed at base, margins ciliate, base truncate or in the larger leaves slightly cordate, petioles sparingly pubescent; most capsules completely sterile, one yielded ten seeds.
B. Leaves ovate-oblong as in *V. fimbriatula,* obscurely serrate, margins and petioles pubescent, base strongly decurrent,— entire outline suggesting that of *V. primulifolia:* capsules many and all fertile.
C. Leaves deltoid, ciliate, truncate, with sinuately toothed margins; capsules numerous, fertile, 16–20 mm. long.
D. Leaves ovate-oblong, truncate, ciliate; capsules fertile, 8–12 mm. long.[1]

30. V. emarginata × sagittata.— Between these two glabrous species the only difference is in leaf-outline. Marked intermediates have been observed, without loss of fertility.— Chester Co., Pa., colony no. 18, June 21, 1903, *W. Stone,* l. c., p. 685; Brookland, D. C., Sept. 28, 1904, *Theo. Holm* (I have grown several plants of this the past season); along the Raritan R. R., Milltown, N. J., Aug. 20, 1904, *Eggleston & Brainerd,* associated with both parents and apart from *V. fimbriatula.*

V. palmata, V. papilionacea, and *V. sororia* furnish another triad quite analogous to that just described. These common species, however different in extreme instances, especially when found outside of each other's range, seem to be confluent when growing together. No sharp line can be drawn between *V. sororia* and *V. papilionacea;* I find many plants of the Middle States that seem quite like the *V. sororia* of Vermont, but they are usually called "pubescent *V. papilionacea,*" "entire-leaved *V. palmata,*" or sometimes *V. laetecaerulea;* much of the Vermont *V. sororia* Mr. Pollard used to name *V. papilionacea. V. palmata* also, passes through the polymorphous phases of its "var. *dilatata*" into both *V. sororia* and *V. papilionacea.* In

[1] I anticipate that some will prefer to consider this a case of "mutation"; perhaps it is,— one's interpretation of facts is so apt to be determined by his predisposition of mind.

none of the forms of this triad have I observed any sign of impaired fertility. Some of this intergradation may be due to the imperfect evolution of the three species, the links ordinarily missing being in this instance still extant; but I have no doubt these species can and do interbreed.

I will speak of only one other instance of confluence, and I am indebted for this to the acute observation of Mr. F. F. Forbes of Brookline, Mass. He has discovered on "Dedham Island," along the Charles River, a station for *V. pectinata*, Bicknell (Torreya, iv. 129, Sept., 1904). The type is from Long Island; but Mr. House also, found it, in May, 1904, near Dayton, N. J. (Bull. Torr. Club, xxxii. 255, pl. 18), and Dr. C. C. Godfrey, in June, 1905, at Stratford, Conn. The species is, to me, distinguishable only by the configuration of the leaf from *V. septemloba*, with which it is associated in all four stations.[1] At "Dedham Island" Mr. Forbes found that the two plants passed, by the most gradual stages, one into the other. I visited the station last May and again last August, and found the plants abundantly spread over a large territory, and showing no sign of impaired fertility. Plate 69 presents the two extreme leaf-patterns and some of the intermediates. Often they closely simulate the leaf of *V. cucullata* × *septemloba* (no. 15); but that is a larger plant, with infertile capsules and dark-brown seeds, due to the black seeds of *V. cucullata;* the seeds of *V. septemloba, V. pectinata* and their intermediates are of a light straw color.

The accompanying diagram presents a bird's-eye view of these hybrids and their parentage. Though the forms are perplexingly numerous, only half of the possible sixty-six hybrids have been brought to light. Others will doubtless be discovered. Moreover, still further complications may be expected; we may find quarter or eighth hybrids, produced by crossing a simple hybrid once, or twice, with one of the parent forms; or we may find triple or quadruple hybrids, produced by crossing a simple hybrid with an allied species other than the parents, or with another hybrid. Some of the hybrids of *V. palmata* × *sagittata* (no. 20) at New Brunswick are very likely not from pure *V. sagittata* but from the *V. fimbriatula-sagittata* combination,

[1] It will be helpful to our understanding of the relations of *V. septemloba* to *V. pectinata*, if we observe the exactly parallel relation of *V. pedatifida* to *V. indivisa*, Greene (Pittonia v. 124, pl. xiii.). The variation of *V. palmata* into *V. Bernardi*, Greene is a movement in the same direction, though not to the same extent.

that is more common at that station. Again, a *V. palmata* parent may have more or less admixture of *V. sororia* or *V. papilionacea*. Miss Day, librarian of the Gray Herbarium, has kindly called my attention to an account of the discovery in the Tyrol, near Innsbruck, of a genuine triple hybrid: *Viola* (*hirta* × *odorata*) × *collina*. (See Magyar Bot. Lapok. ii. 180, June, 1903.)

Middlebury College.

Explanation of Plates 66–70.

Pl. 66, figures a & b, *Viola sagittata* × *septemloba* (*H. D. House*, Hyattsville, Md.).
figure c, *Viola sagittata*, figure d, *Viola septemloba*, } collected at the same time and place with "a."

Pl. 67, figure a, *Viola fimbriatula* × *septemloba* (*Miss F. A. Mulford*, Hempstead, Long Island, N. Y.); grown one year in Middlebury, Vt.
figure b, *Viola fimbriatula*, figure c, *Viola septemloba*, } both from the same station as "a."

Pl. 68, figure a, *Viola fimbriatula* × *sagittata* (*Miss A. M. Ryan*, East Lyme, Conn.).
figures b to e, Leaves of other plants of this cross from same station

Pl. 69, figure a, Leaf of *Viola septemloba*, figure f, Leaf of *Viola pectinata*, figures b to e, intergradient forms, } (*F. F. Forbes*, Dedham, Mass.).

Pl. 70, figure a, Leaf of *Viola fimbriatula*, figure b, *Viola fimbriatula* × *palmata*, figure c, Leaf of *Viola palmata*, } *Robinson & Greenman*, Granny Hill, Lexington, Mass.

In all five plates the figures are × $\frac{7}{8}$.

EXPLANATIONS OF DIAGRAM.

At the bottom of the diagram the names of the twelve species are arranged according to their natural affinity, so far as this can be done in a lineal series. The squares above indicate the sixty-six possible hybrids of these species, the parent species in each case being those included between the sides of the square produced downward to the right and to the left.

The double line indicates the division into subgroups; the heavy lines separate quite distinct species; the broken lines, doubtfully distinct species. The hybrids are numbered as in the text of the article.

—The asterisks indicate the number of stations in which the hybrid has been found, if five or less; if more, the sign + is added.

—The name in any square is that under which the hybrid has been already published, as a species or variety.

—The letters N. C. indicate that the two species are not cohabitant, so that a natural hybrid is not likely to occur.

—The interrogation point denotes plants suspected to be hybrids.

—The sign # denotes variable crosses, resembling the hybrids of Mendel.

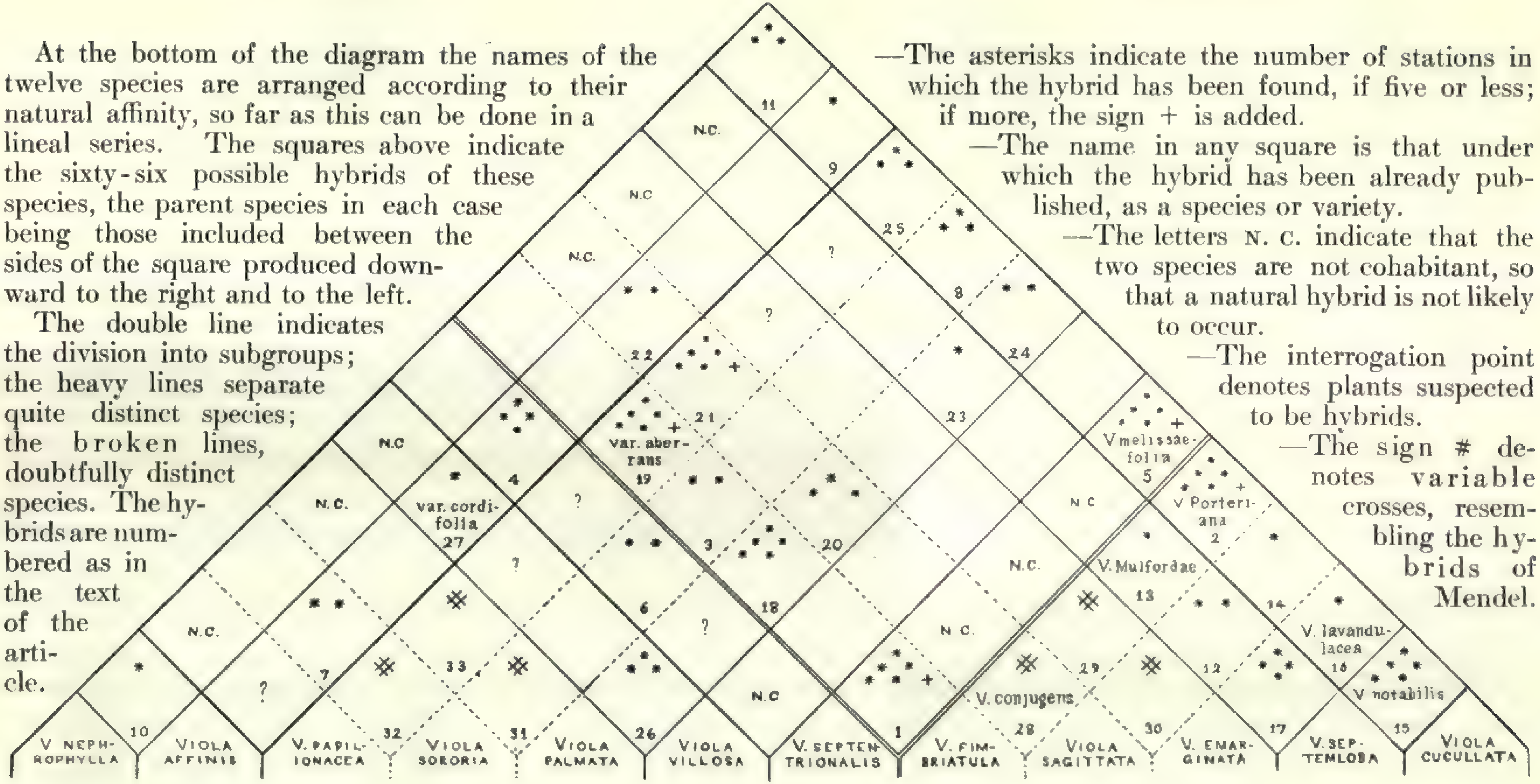

DIAGRAM SHOWING RECOGNIZED AND POSSIBLE HYBRIDS OF TWELVE SPECIES OF VIOLA.

PRELIMINARY LISTS OF NEW ENGLAND PLANTS, — XVIII. SPHAGNACEAE.[1]

A. LeRoy Andrews.

[The sign + indicates that an herbarium specimen has been seen; the sign — that a reliable printed record has been found.]

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Sphagnum acutifolium Ehrh.	+	+	+	+	+	+
Sphagnum auriculatum Schpr.	+			+		
Sphagnum compactum DC.	+				+	
Sphagnum compactum var. squarrosum Russ.	+			+		
Sphagnum contortum Schultz.		+		+	+	+
Sphagnum cuspidatum Ehrh.	+		+	+	+	+
Sphagnum cuspidatum var. falcatum Russ.	+			+		+
Sphagnum cuspidatum var. Miquelonense R. & C.	+	+	+	+	+	+
Sphagnum cuspidatum var. plumosum Bryol. Germ.	+			+		+
Sphagnum cuspidatum var. Torreyanum (Sull.) Braithw.				+		
Sphagnum cymbifolium Ehrh.	+	+	+	+	+	+
Sphagnum cymbifolium var. squarrosulum Bryol. Germ.	+	+		+		+
Sphagnum dasyphyllum Warnst.						+
Sphagnum Dusenii C. Jensen	—	+				
Sphagnum fimbriatum Wils.	+	+		+		+
Sphagnum fimbriatum var. squarrosulum H. Müll.				+		
Sphagnum fuscum (Schpr.) von Klinggr.	+	+	+	+		+
Sphagnum Garberi L. & J.	+					
Sphagnum Girgensohnii Russ.	+	+	+	+		+
Sphagnum Girgensohnii var. coryphaeum Russ.	+	+	—	+		
Sphagnum Girgensohnii var. molle Russ.	+	+		+		
Sphagnum imbricatum Hornsch.	—	+		+	+	+
Sphagnum imbricatum var. affine (R. & C.) Warnst	+	+		+	+	+
Sphagnum imbricatum var. sublaeve Warnst.	+	+		+	+	+
Sphagnum inundatum Russ.	+	+		+		

[1] This list was mailed to me shortly before Mr. Andrews sailed for Europe. At his request I have inserted dashes to indicate such available printed records as related to the species and varieties mentioned in his list. Aside from these few insertions the list remains unchanged. — J. Franklin Collins.

[1] Printed in Rhodora as supplementary matter.

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Sphagnum Lindbergii Schpr.		+				
" macrophyllum Bernh.					+	
" medium Limpr.	+	+	+	+	+	+
" molle Sulliv.	+					
" molluscum Bruch.	+					
" obesum Wils.		—		+	+	+
" papillosum Lindb.	+	+			+	
" platyphyllum Sulliv.				+		+
" plicatum Warnst.				+		
" pulchrum (Lindb.) Warnst.	+	+				
" Pylaiei Brid.	+	+				
" quinquefarium (Braithw.) Warnst. .	+	+	+			
" recurvum Beauv.	+	+		+	+	+
" " var. amblyphyllum Russ. .	+	+	+	+	+	+
" " var. parvifolium (Sendt.) Warnst.	+	+	+	+	+	
" riparium Ångstr.		+				
" rubellum Wils.	+	+	+	+		+
" rufescens Bryol. Germ.	+	+		+	+	+
" Russowii Warnst.	+	+	+			
" squarrosum Pers.	+	+	+	+		
" subnitens Russ. & Warnst.	+	—				
" " var. flavicomans (Card.) Warnst.	+			+		+
" subsecundum Nees.	+	+	+	+	+	+
" tenerum (Aust.) Warnst.	+	+	+	+	+	+
" teres (Schpr.) Ångstr.	+	+	+	+		
" " var. squarrosulum (Lesq.) Warnst.	+	+	+			
" Warnstorfii Russ.	+	+	+	—		+
" Wulfianum Girgens.	+	+	+			

Notes on the Preceding List.

The above list is based essentially upon the latest treatment of Warnstorf (Kryptogamenflora der Mark Brandenburg und angrenzender Gebiete, Bd. I, Leber- und Torfmoose, C. Warnstorf, Leipzig, 1903. Sphagna Ss. 292–467), which considers the Sphagna of Europe. Nearly all of the New England species are common to Europe. This recent work differs from Warnstorf's earlier treatment of North American forms (Contributions to the Knowledge of North American Sphagna, Bot. Gaz., Vol. 15, 1890, pp. 127–140, 189–198, 217–227, 242–255), with later scattered descriptions collected in

Barnes and Heald's Keys, in the fact that several forms there treated as varieties have been elevated to specific rank. In the treatment of species I have differed in the following points: *S. subbicolor* Hampe (*S. intermedium* Russ., *S. centrale* C. Jens.) I have not been able to separate satisfactorily from the forms of *S. cymbifolium*. It is placed between this species and *S. papillosum*, having walls of hyaline cells of branch leaves smooth as in *S. cymbifolium*, but differing slightly in shape and position of chlorophyllose cells, a matter however of considerable variability in this group as Röll has pointed out. I have seen New England specimens referred to it. *S. parvifolium* (Sendt.) Warnst. I have retained in its former place as a variety of *S. recurvum*. *S. Torreyanum* Sull. and its variety *Miquelonense* I have in the same way retained with *S. cuspidatum*. With reference to the varieties which have been named in such numbers in this genus I have included such as appear to show a distinct and readily recognized variational tendency, upon which various authors show general agreement. In so doing I have omitted varieties based upon the presence of a greater or less amount of coloring pigment, relative slenderness or compactness of the plant, direction of the branches, and other characters possibly explainable as due to immediate environment of the plants, calling for an arbitrary delimitation, and of questionable systematic value. In case a species has been exhausted by varieties so that no form appears to remain under the head of the species, as in *S. imbricatum*, I have omitted the variety corresponding with the original conception of the species, in this case var. *cristatum* Warnst. In the same way I have included var. *mucronatum* Russ. with its species *S. recurvum*.

If the list emphasizes the fact that the New England species, or for that matter the American species of Sphagnum, are in need of extensive collection and study, it will have served its purpose. A very little collecting in Vermont should serve to fill many gaps in the list, while the same is true in hardly less degree of the other states. Especially do the questionable aquatic forms need particular attention. The status of the species, especially in the subsecunda group, can hardly be regarded as settled, and also demands the attention of the collector.

In addition to the species included in the list the following European forms may be looked for in New England with a prospect of success; *S. Ångstroemii* Hartm., a very distinct species of high latitudes, may possibly be found on the mountains of the northern states. It has recently been collected in America, a specimen kindly com-

municated by Warnstorf bearing the label, Hunker Creek, Yukon, J. Macoun, '02. From the cuspidata group the following are to be noted: *S. monocladum* (v. Klinggr.) Warnst., *S. Trinitense* C. Müll. (known from Florida), *S. fallax* v. Klinggr., *S. obtusum* Warnst., *S. Balticum* Russ., *S. Schultzii* Warnst., *S. hypnoides* (A. Braun.) Bruch, *S. annulatum* Lindb. fils; from the acutifolia group *S. subtile* (Russ.) Warnst.; from the subsecunda group *S. crassicladum* Warnst., *S. turgidulum* Warnst. Furthermore several species of southern United States range occurring as far north as New Jersey, mostly members of the cymbifolia and subsecunda groups, may be sought in the coast-region of Connecticut and Rhode Island. The specific value of most of the latter segregates can hardly be regarded as determined without more extensive collections.

With reference to the record of localities from which specimens were not seen Mr. J. F. Collins has very kindly examined the local list and the — signs in the above list are to be accredited to him.[1]— A. LeRoy Andrews, Berlin, Germany.

SOME NOTEWORTHY PLANTS OF THE PENOBSCOT VALLEY.

Ora W. Knight.

Lilium tigrinum Ker. Growing along the roadside remote from houses in Holden, three stations being known for several years.

Allium schoenoprasum L. A station, discovered by Mr. F. M. Billings and myself, along the Penobscot River, near Veazie, is the only one we have found in this region.

Cypripedium arietinum R. Br. Hundreds of plants were in bloom on a steep hillside in rich mixed growth in the town of Bucksport, where Mr. F. M. Billings, Mr. Norman Hall and I found them May 20, 1904.

Populus dilatata L. Along the banks of the Penobscot River in Veazie, and not near any cultivated grounds, several hundred square feet are covered by a growth of this species ranging from small shoots to good sized trees. Seemingly all are connected at the roots.

Castanea sativa americana Gray. In 1904 I found a good sized tree of the chestnut growing near the roadside in a beech and oak

growth in the town of Holden, and on July 28 collected flowering specimens. This was not near any house or cultivated land and had no evidence of being put there by the hand of man.

Polygonum zuccarinii Small. A small clump has persisted near the roadside on Stillwater Ave., town of Orono, for several years and does not appear to be growing under conditions which would indicate anybody planted it there.

Conringia perfoliata Link. Collected by me along the water front, Bangor, July 4, 1904.

Polygala paucifolia, forma **albiflora**. Whole plant much paler than the typical form of this species and the blossoms white. This albinistic form grows very abundantly in an extensive tract of open woods and pasture land in Bangor, forming extensive carpets of plants and bloom. A few plants of the normal form grow scattered through the same territory.

Mimulus moschatos Dougl. Mr. F. M. Billings brought me a plant of this species which he collected on ballast along the water front, Bangor, July 28, 1904.

Teucrium boreale Bicknell. I collected a number of plants in bloom which I took for our common Teucrium, and which were growing in a meadow near Stillwater Avenue just within the limits of Orono, August 10, 1904. Thinking them the common species I did not take so many as I otherwise would have. Professor Fernald pronounces my specimens to be as above. The same locality was closely watched during 1905, and though hundreds of small plants were seen, only two showed bloom and these only a very few buds and flowers. The previous year all the plants were tall, lusty and full of bloom. Can it be that this species is biennial?

Tragopogon porrifolius L. I have a specimen collected in a field in Stillwater (Oldtown), July 5, 1903, by Mr. Billings.

Tragopogon pratensis L. I have specimens from both Orono and Bangor. The Bangor plants are well established along a roadside within the residential portion of the city and have been persistent for several years.

Lychnis flos-cuculi L. Though not growing in the Penobscot valley this seems good opportunity to record finding this species not far distant in the town of Pittsfield. It has been established several years and when I saw it in June, 1905, covered many acres of fields with a mass of bloom.

Bangor, Maine.

CONTRIBUTIONS TO THE CYTOLOGY OF THE ENTOMOPHTHORACEAE: PRELIMINARY COMMUNICATION.

Lincoln Ware Riddle.

For the past two years the writer has been engaged in a study of the cytology of certain species of *Empusa* and of *Entomophthora*. One species of *Empusa* and four species of *Entomophthora* have been examined.

It has been found that the nucleus of *Entomophthora* has a highly developed structure, showing little resemblance to the nucleus of the Yeast, as Cavara suggested. Further the nucleus of *Entomophthora* undergoes a more or less typical mitotic division. The resting-nucleus shows a rather small nucleolus surrounded by a densely granular chromatin-content, which may at times appear as a network. During prophase the chromosomes (of which there are 8 in *E. Americana*) are formed by the direct aggregation of the chromatin-granules, without the intervention of a spireme-stage. This drawing together of the chromatin leaves evident a number of linin-fibers, running from the spherical chromosomes to the nuclear-wall which persists throughout mitosis. These linin-fibers gradually separate into two groups which draw toward the respective poles, forming a typical, intranuclear bi-polar spindle. No centrosomes were seen in any case. The so-called nucleolus appears to be strictly a karyosome, as it is identical with the chromosomes in appearance and behavior during division. The later phases of mitosis are much as in other cases.

The nuclear details of zygospore-formation agree essentially with those described by Gruber for *Sporodinia*; and the process in general shows a close agreement with conditions in the Mucorales. The zygospore either buds out at the point of fusion of the hyphal bodies (compare the conditions in *Piptocephalis*) or else buds out from one of the gametes (compare the conditions in *Syncephalis nodosa*). In either case the fusing hyphal bodies are multinucleate structures and are therefore coenogametes — a type of sexual organ shown by Davis and others to be characteristic of the Phycomycetes. The entire contents of both gametes, including all of the nuclei, pass into the young zygospore. No fusion of the nuclei occurs during the first

three months. Whether or not fusion in pairs occurs at the time of germination, as we should expect, it has been so far impossible to determine, owing to the difficulty of germinating the zygospores.

The formation of the azygospores in *Empusa* was found to present conditions quite different from those described by Vuillemin for *Entomophthora gleospora*. In the case of *Empusa* the entire contents of the hyphal body, including all of the nuclei, which may number over 40, pass into an ampulla which is cut off, forming the azygospore. No further changes take place in these nuclei so far as has been observed. The writer offers the suggestion that this structure is in the nature of a chlamydospore, a view which is further supported by the fact that an encysted hyphal body, as a means of tiding over the winter, may frequently be substituted for the usual azygospore.

The cytological conditions show that *Entomophthora* is a more highly developed genus than *Empusa*. The general results here described bring these genera into complete accord with the conditions known in other *Phycomycetes*. The complete paper presenting in full the evidence for the statements here made is now in preparation.

Harvard University.

A new Station for Asplenium ebenoides.— Just outside the town of Salisbury, Vermont, there is, a few feet from the roadside, an open grove of trees, surmounting an out-cropping ledge of limestone. On this ledge I found *Asplenium ebeneum* and *Camptosorus rhizophyllus* in abundance, but search failed to discover *Asplenium ebenoides* among them. About fifty feet away, however, in the open pasture the limestone again jutted out, and here I found a large plant of *A. ebenoides*, from which a frond was sent to the Gray Herbarium where the identification was confirmed. A smaller plant some five feet away and still a third, very small and just assuming shape, were found. *A. ebeneum* grew profusely upon this rock, but I found only a few inferior plants of the walking-leaf.— Anna W. Smith, West Brattleboro, Vermont.

[It is believed that the locality, here reported by Miss Smith, is by a few miles the most northern station for *A. ebenoides* as yet recorded, at least in New England.— Ed.]

Vol. 8, no. 86, including pages 25–48, was issued February 26, 1906

VIOLA SAGITTATA × SEPTEMLOBA, AND LEAVES OF PARENT SPECIES.

VIOLA FIMBRIATULA × SEPTEMLOBA (V. MULFORDAE).

Variable leaves of Viola fimbriatula × sagittata.

VIOLA SEPTEMLOBA, V. PECTINATA AND INTERGRADIENT FORMS.

VIOLA FIMBRIATULA × PALMATA, AND LEAVES OF PARENT SPECIES.

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Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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THE GENUS STREPTOPUS IN EASTERN AMERICA.

M. L. Fernald.

The two "Twisted Stalks," *Streptopus amplexifolius* (L.) DC. and *S. roseus* Michx., are common in woodlands of eastern Canada and many portions of the northern United States; and though both plants have the solitary erect stem springing from a short thick caudex and usually forking above, they are in many technical characters clearly distinct. The stems of *S. amplexifolius* are whitish and glabrous above, in *S. roseus* greenish and usually ciliate-hispid above. The strongly glaucous amplexicaul leaves of *S. amplexifolius* are glabrous throughout, those of *S. roseus* green, scarcely amplexicaul, and conspicuously ciliate on the margins. The perianth of *S. amplexifolius* is campanulate at base, but the segments spread widely from near the middle and quickly become recurved; that of *S. roseus* campanulate, the segments slightly if at all divergent, only the old shrivelling tips becoming recurved. The anthers of *S. amplexifolius* are lance-subulate, entire, and many times longer than the filaments; of *S. roseus* narrow-ovate, bicuspidate, and about the length of the filaments. The stigma of *S. amplexifolius* is subentire or merely shallow-lobed, of *S. roseus* deeply 3-cleft.

Besides these two well-known plants, another species, *Streptopus brevipes* Baker (*S. curvipes* Vail) occurs in the mountains from Alaska to Oregon. It resembles a small simple-stemmed *S. roseus* but has shorter pedicels and a very slender elongate rootstock. So far as known this characteristic plant does not occur east of the Rocky Mountains.

In northern Michigan, however, there is a plant which in its slender rootstock is apparently nearest related to the northwestern *S. brevipes*,

but which has the stem forking, the leaves glaucous and soft-ciliate, and the pedicels and flowers much longer than in *S. brevipes*; and in the alpine regions of the Shickshock Mountains of eastern Quebec there is another plant with a simple or subsimple stem suggesting *S. brevipes*, but with short thick caudex and ciliate leaves much as in *S. roseus*, and purplish flowers structurally like those of *S. amplexifolius*. These two plants, that of northern Michigan with slender rootstocks, and the Shickshock plant with usually simple stems, ciliate leaves and strongly recurved perianth segments, are apparently species which have heretofore been unrecognized in our flora. In order to make clearer the affinities of these plants, the characters of the other eastern species of *Streptopus* are briefly included in the following synopsis.

* Rootstock short and thick.

+– Perianth-segments wide-spreading or recurved from near the middle: anthers lance-subulate, entire, many times exceeding the filaments: stigma subentire or merely lobed.

Streptopus amplexifolius (L.) DC. *Stem* forking, very rarely simple, 3–9 dm. high, *whitish-green and glabrous* except occasionally at base: *leaves* amplexicaul, *glabrous throughout, glaucous beneath: peduncles glabrous*, simple or forked, in anthesis 1.5–3 cm., in fruit 1.5–8 cm. long: *perianth greenish-white or sometimes roseate*, its lance-attenuate segments 8–11 mm. long: fruit globose to ellipsoid, 1–2 cm. long, scarlet.— Fl. Fr. iii. 174 (1805). *S. distortus* Michx. Fl. i. 200 (1803). *S. amplexicaulis* Poir. Dict. vii. 467 (1806). *S. amplexifolius, β. americanus* Roemer & Schultes, Syst. vii. 311 (1829). *Uvularia amplexifolia* L. Sp. 304 (1753).— Throughout the forested area from Labrador to Alaska, south to the mountains of North Carolina, Michigan, South Dakota, New Mexico, and northern California; in eastern Quebec ascending to subalpine regions: Greenland, Europe, and Asia.

S. oreopolus sp. n. Caule simplice vel semel furcato 2–3.5 dm. alto viridi ciliato-hispido; foliis ovatis vel lanceolatis subamplexicaulibus ciliato-denticulatis, supra viridibus subtus pallidis vix glaucis 3–8.5 cm. longis 0.7–3 cm. latis; pedunculis exigue hispidulis 1–3 cm. longis; perianthio vinaceo, segmentis lanceolato-attenuatis superne falcatis 8–12 mm. longis; antheris lanceolato-subulatis integris quam filamenta longiroribus; stigmate subintegro vel trilobato.

Stem simple or once forked, 2–3.5 dm. high, *green, ciliate-hispid: leaves* ovate or lanceolate, slightly amplexicaul, *ciliate-denticulate*, green above, *pale but scarcely glaucous beneath*, 3–8.5 cm. long, 0.7–3 cm. broad: *peduncles sparingly hispidulous*, 1–3 cm. long: *perianth claret-color*, the lance-attenuate strongly falcate segments 8–12 mm.

long: anthers lance-subulate, entire, longer than the filaments: stigma subentire or 3-lobed: fruit unknown.—QUEBEC, mossy knolls and damp rocks above timber-line, altitude 1000–1050 meters, Mt. Albert, Gaspé County, August 8–15, 1905 (*J. F. Collins & M. L. Fernald*).

+ + Perianth-segments with the tips only recurved in age: anthers ovate 2-horned, shorter than or about equalling the filaments: stigma 3-cleft.

S. ROSEUS Michx. *Stem* usually forked, rarely simple, 2.5–6 dm. high, *often hispidulous above: leaves slightly or scarcely amplexicaul the margins ciliate:* peduncles simple or forked, 1–2.5 cm. long: *perianth pink-purple,* the lanceolate segments 8–12 mm. long: *fruit subglobose, about* 1 *cm. in diameter, cherry-red.*— Fl. i. 201, t. 18 (1803). *Uvularia rosea* Pers. Syn. i. 360 (1805). *Hexorima dichotoma* Raf. Med. Rep., Hex. 2, v. 351 (1808) and Journ. de Phys. lxxxix. 262 (1819). *Hekorima dichotoma* Kunth, Enum. iv. 204 (1843).— In woods, Newfoundland to the mountains of Georgia, west to Wisconsin and Manitoba; in New England ascending to the subalpine districts.

* * Rootstock slender and wide-creeping.

S. longipes sp. n. Rhizomate elongato tenui (2–4 mm. diametro); caule furcato apice ciliato-hispido 3–4 dm. alto; foliis ovatis vel ovato-lanceolatis sessilibus ciliatis, subtus pallidis, 4–6.5 cm. longis 1.5–3 cm. latis; pedunculis ciliato-hispidulis 1.5–2 cm. longis; perianthio campanulato rubello, segmentis lanceolato-attenuatis 10–12 mm. longis; antheris lanceolato-ovatis bifidis quam filamenta brevioribus; stigmate trifido.

Rootstock elongate, 2–4 *mm. in diameter:* stem forked, ciliate-hispid above, 3–4 dm. high: leaves ovate or ovate-lanceolate, sessile, ciliate, pale beneath, 4–6.5 cm. long, 1.5–3 cm. broad: peduncles simple, ciliate-hispid, 1.5–2 cm. long: perianth campanulate, reddish, the lance-attenuate segments 10–12 mm. long: anthers lance-ovate, 2-horned, shorter than the filaments: stigma 3-cleft: fruit unknown.— MICHIGAN, in forest of *Acer Saccharum,* Turin, Marquette County, June 5, 1901 (*Bronson Barlow*).— Resembling a pale-flowered *S. roseus,* but clearly distinct in its slender elongate rootstock. Nearer the northwestern *S. brevipes* which has simple stems, darker entire or denticulate but scarcely ciliate leaves, shorter peduncles (in fruit rarely 1 cm. long) and shorter perianth (5–9 mm. long).

GRAY HERBARIUM.

NOTES ON SOME PLANTS OF BANGOR, MAINE.

Ora W. Knight.

The plants which are mentioned in this article were collected within the limits of Bangor jointly by Mr. F. M. Billings and myself. Many are new to the State while others are from beyond the previously known limits of distribution in Maine. Specimens of all these plants have been submitted to Prof. M. L. Fernald of the Gray Herbarium for identification, and I am very sure we have presented him with duplicates of all the species here recorded.

Salix nigra Marsh. Specimens in fruit were collected from a stunted shrub growing on the shore of the river above Bangor, June 15, 1904. We know of no other plant of this species near here.

Urtica dioica L. Found growing in ballast on a wharf near "High Head" August 7, 1904.

Filipendula ulmaria Maxim. Roadside out Hammond St. and not near any house, July 25, 1904. Also seen in same place in 1905.

Sisymbrium altissimum L. Common along the water front between "City Point" and waterworks in 1904 and 1905.

Vicia tetrasperma Moench. Growing abundantly in grass land in rear of a house for the last five years.

Lotus corniculatus L. Growing in ballast along water front below "High Head" in 1904 & 1905.

Trifolium dubium Sibth. In ballast on wharf below "High Head" July 16, 1905.

Aegopodium podagraria L. Weed in waste places, escaping to roadside from cultivated ground where it is grown as an ornamental foliage plant.

Echinospermum lappula Lehm. In ballast on wharf July 4, 1904.

Anchusa arvalis Reich. First recorded in Rhodora, May, 1904, p. 91. This species is a persistent perennial, and though not spreading seems inclined to hold fast where first found by us.

Convolvulus arvensis L. Growing in rear of warehouse along the water front at "High Head." We have not found it elsewhere. It seems to be spreading in this particular spot.

Galeopsis ladanum L. Ballast on wharf, July 16, and Aug. 7, 1904.

Stachys annua L. With the preceding at same time and place.

Stachys palustris L. Found growing near the edge of a field in moist soil, by Mr. Billings, July 7, 1901.

Scutellaria churchilliana Fernald. Wet ground along the Penobscot River below the waterworks in 1904. Also found along river in town of Veazie in 1905.

Scrophularia leporella Bicknell. Observed along the water front in Bangor the past three years, and found in Brewer by Mr. Billings in 1905.

Crepis virens agrestis Koch. Many plants growing on a wharf below "High Head," July 16, 1904. Thinking it merely a form of the common fall dandelion we took only a few specimens.

Bangor, Maine.

THE VARIATIONS OF CAREX PAUPERCULA.

M. L. Fernald.

In 1803 Michaux described from Lake Mistassini at the head of Rupert River a small *Carex* which, from its tiny few-flowered spikes, he named *C. paupercula*.[1] By subsequent authors the Michaux plant has been treated without question as a depauperate phase of the polar *C. irrigua* of J. E. Smith[2] (1826) which was based upon *C. limosa*, var. *irrigua* originally published by Wahlenberg[3] in 1803 from Scandinavia; while by many recent authors both *C. paupercula* and *C. irrigua* have been treated as identical with the antipodal *C. magellanica*, described by Lamarck[4] in 1789 from the Straits of Magellan.

A recent study of these three plants has convinced the writer that in our ordinary interpretation of them we have drifted far from the original conceptions of Lamarck, Michaux, and Wahlenberg; and that in order to emphasize certain points which have been too generally ignored it is necessary to review the characteristics of the plants. Since the boreal plant described as *Carex irrigua* is of the broadest distribution and consequently the best known of the three it may appropriately receive the first consideration.

As already stated *Carex irrigua* has by many students been regarded

[1] Michx. Fl. ii. 172 (1803).
[2] Smith in Hoppe, Caric. Germ. 72 (1826).
[3] Wahl., Act. Holm. (1803) 162.
[4] Lam. Encyc. iii. 385 (1789).

as identical with *C. magellanica.* This identity, as interpreted by Francis Boott, was not absolute for, while in 1847 he had regarded the plants as specifically distinct,[1] he subsequently treated them as varieties of one species. In doing so, however, he reversed in a manner which would nowadays be considered quite irregular the nomenclatorial status of the plants, offering the following explanation:— "I have adopted the name of Lamarck [*magellanica*], as I cannot see any specific distinction between the Fuegian and the European and [North] American plant; but I have described the last as the typical form, as most generally known, giving a figure of the first as a var. β." [2]

Subsequent authors have varied in their interpretation of the two plants, but those who have followed Francis Boott in regarding them as specifically inseparable have generally failed to indicate that there is even a varietal difference between the two. Others, however, have regarded the boreal *Carex irrigua* as specifically distinct from *C. magellanica*; and an examination of specimens collected by Dr. R. O. Cunningham in January, 1869, at Port Famine, and of the descriptions and plates of Schkuhr, Boott, and others, indicates that this is the wiser course.

In the first place, *Carex magellanica* has androgynous spikes. All descriptions from Lamarck's original[3] in 1789 to Macloskie's[4] in 1904 agree upon this, and in the plates of Schkuhr[5] and the Flora Antarctica[6] the plant is thus represented, though in Boott's Illustrations[7] one of the five specimens drawn is shown with the terminal spike wholly staminate; and Boott states upon the authority of Spach that, of the 26 specimens in the Herbarium of the Muséum d'Histoire Naturelle at Paris 2 have the terminal spike staminate and 24 have it staminate only at base. Of the boreal *C. irrigua* which has recently passed as *C. magellanica* I have examined 633 inflorescences of which 600 have the terminal spike strictly staminate and only 33 have it more or less androgynous. These figures, then, show very clearly opposite tendencies of the two plants.

Furthermore, the much larger scales of *Carex magellanica* are nearly or quite as broad as the perigynia. In *C. irrigua,* on the other hand, the shorter narrower scales so fail to cover the perigynia that even in

[1] Boott in Hook. Fl. Antarct. 365 (1847).
[2] Boott, Ill. ii. 80 (1860).
[3] Lam. Encyc. iii. 385 (1789).
[4] Macloskie, Fl. Pat. 284 (1904).
[5] Schkuhr, Riedgr. 52, t. N., fig. 51 (1801).
[6] Hook. Fl. Antarct. t. 143. (1847).
[7] Boott. Ill. ii. t. 220 (1860).

comparatively young plants those whitish organs extend conspicuously each side of the narrow scales.

One other character which, from the material at hand, seems to separate the Fuegian and Patagonian plant from its boreal ally is in the leaf-sheath. In *C. magellanica* the pale nerveless band which extends down the sheath from the auricle is rather firm, opaque, and strongly dark-dotted. In *C. irrigua* it is thin and membranous, translucent, and faintly or obscurely dotted.

In view of these well marked characters of the plants it seems that the true *Carex magellanica* of the Patagonian and Fuegian region is a species quite as distinct from the extreme boreal *C. irrigua* as are its other allies, *C. laxa*, *C. limosa*, and *C. rariflora*. The boreal plant, *C. irrigua*, however, presents in North America three well marked variations which it is the final purpose of this paper to discuss. This fact, that not all the North American specimens are identical with those of polar and alpine Europe, was noticed as early as 1841 by Drejer who said: "Specimina americana majora et vegetiora sunt, quum ulla europaea, quae vidi"[1]; and this statement was seconded by Francis Boott[2] who added that the culm of the North American plant is frequently scabrous, but who, nevertheless, preferred to regard this taller often scabrous North American plant as the "typical" *C. magellanica* because it was "most generally known."

A study of the abundant material of *Carex irrigua* in the Gray Herbarium and the Herbarium of the New England Botanical Club shows that in the colder parts of Canada and the Eastern States the common phase of the plant is quite like the European in its comparatively low stature, castaneous scales, and ordinarily glabrous culms. Southward and in the Great Lake region, however, the common form differs in the characters mentioned by Drejer and by Boott; and with its tendency to greater stature and often scabrous culms it shows less color in the scales, these having green central portions and pale brown to straw-colored margins. In none of these points is the plant thoroughly constant, but as a fairly marked American variety it seems advisable to separate it from the true *C. irrigua* which in Europe rarely if ever tends to such an extreme.

Another tendency of the species is the plant which was discovered by Michaux at Lake Mistassini and which abounds in alpine bogs of

[1] Drejer, Revis. 51 (1841). [2] Boott, Ill. ii. 80 (1860).

the Shickshock Mountains, in Gaspé Peninsula. It is quite like the typical *Carex irrigua* except for its smaller stature and its tiny few-flowered spikes. This plant was described by Michaux as a distinct species, and a beautiful pencil-sketch in the Gray Herbarium, with detailed drawings by Decaisne, of an original Michaux specimen, leaves no question of the identity of the Shickshock plant. This dwarf alpine or subalpine extreme has the dark scales and the glabrous culms of typical *C. irrigua,* so that there is no doubt of its true affinity. So far as known to the writer this few-flowered plant is confined to the colder parts of eastern Canada; but since it was described as a species by Michaux in 1803, long before the wider-distributed *C. irrigua* was given specific recognition in 1826, we are obliged, by the rulings of the recent International Congress at Vienna, to retain for the species the name given it by Michaux.

The characteristics and nomenclature, then, of the three phases of *Carex paupercula* may be summarized as follows.

Carex paupercula Michx. Culms 1–2.5 dm. high, glabrous: pistillate spikes few-flowered, ovoid, 4–8 mm. long: scales castaneous throughout. — Fl. ii. 172 (1803). — Quebec, Lake Mistassini (*Michaux*); alpine bogs, Mt. Albert, Gaspé Co., August 12, 1905 (*Collins & Fernald,* no. 48).

Var. **irrigua** (Wahbenberg) comb. nov. Plant 1–4.5 (very rarely becoming 5–8) dm. high; the culm usually glabrous: pistillate spikes cylindric, in maturity 1–1.6 cm. long: scales castaneous throughout.— *C. limosa, β, irrigua* Wahl. Act. Holm. (1803) 162; Dewey, Sill. Jour. x. 42 (1826); Torr. Ann. Lyc. Nat. Hist. N. Y. iii. 425 (1836). *C. limosa γ, irrigata* Wahl. Fl. Lapp. 243, t. 15, fig. 2 (1812). *C. lenticularis* Dewey, Sill. Jour. vii. 273 (1824), not Michx. *C. irrigua* Smith in Hoppe, Caric. Germ. 72 (1826); Hoppe & Sturm, Caric. Germ. t. 38 (1829); Reich. Ic. Fl. Germ. viii. 17, t. 238, fig. 594 (1846); Carey in Gray, Man. 549 (1848); Anders. Cyp. Scand. 36, t. 7, fig. 72 (1849); Liebm. & Lange, Fl. Dan. Suppl. 13, t. 106 (1865). *C. magellanica* Boott, Ill. ii. 80, t. 219, 220 (1860); Dewey, Am. Jour. Sci. xxxix. ser. 2, 70 (1865); Bailey, Proc. Am. Acad. xxii. 94 (1887) and in Gray, Man. ed. 6, 602 (1890); Britton in Britton & Brown, Ill. Fl. i. 313 (1896), in part; not Lam.— Boreal and alpine regions of Europe. In America from the subarctic regions south in cold bogs and on mountains to Nova Scotia, northern Worcester Co., Massachusetts, Pocono Mt., Pennsylvania, Pic River, Ontario, and

UTAH. Most abundant from the Gulf of St. Lawrence to the White Mountains.

Var. **pallens** var. nov. Planta 3–8 dm. alta, culmis saepe scabris; spicis cylindricis 1–1.8 cm. longis, squamis viridibus margine fulvis vel flavescentibus.— NOVA SCOTIA, peat bogs, North Sydney, July 11, 1883 (*J. Macoun*): MAINE, Arbor Vitae swamps, Presque Isle, July 12, 1902 (*Williams, Collins, & Fernald*); Arbor Vitae swamp, Blaine (*Fernald*, no. 2038); bog, Crystal, June 24, 1898 (*Fernald*, no. 2036); sphagnous swamp, Sangerville, July 1, 1895 (*Fernald*, no. 254); Cedar swamp, Buckfield, July 1, 1878 (*J. A. Allen*, no. 21a.): NEW HAMPSHIRE, Tuckerman's Ravine, July 11, 1895 (*J. R. Churchill*); Crawford Path, Mt. Clinton, July 18, 1895 (*E. & C. E. Faxon*): VERMONT, Burlington, June 15, 1896 (*A. J. Grout*); Cedar swamp, Fair Haven, June 27, 1899 (*W. W. Eggleston*): MASSACHUSETTS, Washington, Berkshire Co., July 5, 1859 (*W. Boott*): CONNECTICUT, sphagnous swamp, Norfolk, June 14, 1904 (*C. H. Bissell*): NEW YORK, Big Square Pond, Adirondack Mts., July 2, 1899 (*Rowlee, Wiegand, & Hastings*); Big Swamp, Oriskany (*Knieskern*): MICHIGAN, Washington (*D. Cooley*); deep swamp, Lansing, July 5, 1886 (*L. H. Bailey*, no. 101), June 24, 1892 (*C. A. Davis*); Howell Junction, June 10, 1890 (*C. F. Wheeler*): MINNESOTA, Minneapolis, July, 1886 (*H. M. Simmons*): BRITISH COLUMBIA, head of Deadman's River, June 21, 1889 (*J. M. Macoun*).

GRAY HERBARIUM.

INTUITION AS A SUBSTITUTE FOR REFERENCE.

FRANK SHIPLEY COLLINS.

WHEN a new genus is proposed, it is usual for the author to indicate the derivation of the new name; and in manuals, floras, etc., these derivations are often given for all the genera. Some authors, however, have neglected to give any explanation of their new names, so that only more or less successful guesses can be made in subsequent works. But when the later writer depends, as a rule, on his intuitions, a comparison with the original description may show a curious difference, as seen in the two cases following.

Among the few algae mentioned in Provancher, Flore Canadienne,

we find a reference to a quite rare genus of fresh water, Thorea; it is doubtful if the plant the author had in mind really belongs to this genus; but the reference is not without interest in another way. The genus is noted, p. 760, as follows: — "Thorée, Thorea, Bory. (Allusion au dieu Thor des Scandinaves, qu'on represéntait velu, comme les rameaux de cette plante.)" Such curious derivations of botanical names are not unknown, but a reference to the original description by Bory de St. Vincent, Annales du Muséum, Vol. XII, p. 126, 1808, shows a dedication to the discoverer, Dr. Thore, of the town of Dax, an excellent botanist, author of a local flora, etc. Now nothing is more common than neglecting to look up the original description of a plant you are discussing, but what a powerful imagination the Abbé Provancher must have had; or did he have some trusted but untrustworthy friend, with no respect for the cloth?

Another case of quite a different character, where an originally romantic name is reduced to most ordinary prose, can be found in connection with the genus Pandorina. All algologists know the Sylloge Algarum of De Toni; a compilation in systematic order of the descriptions of all recognized species of algae, with references and synonyms. It is a book that no working algologist can be without, and indeed, it is a most useful index; the plan is excellent, but there are so many inaccuracies, that one sometimes is reminded of the remark of the ancient Roman about the women; "there is no living without them, nor with them."

The work is in Latin, and the derivation of Pandorina is given, "*pas*, totus, *dora*, vestis detracta." The original description is not easy to find, being in the Encyclopédie Methodique, published in various series with all sorts of titles and subtitles; it is in the Histoire Naturelle de Zoophytes, vol. II, p. 600, 1824, and translated, reads, "Genus of microscopic organisms, type of the singular family of Pandorinae, in the order of the Gymnopodinae. The living molecules of which are composed the beings that we here include, are contained in a common envelope, within which they dwell, either independent of each other, or else in motile groups, still in the interior of the common envelope. This common envelope reveals, by its transparency, the strange mysteries of an organization where each individuality persists; that is to say, where the molecule seems to exercise a life of its own, while at the same time it co-operates in the general life. But as, when the box of Pandora opened to spread over

the earth what was contained in it, so here when the general envelope that imprisons the contained molecules is broken, the latter spread in every direction in virtue of a volition pertaining to each one of the globules, now become free. The discovery of such phenomena filled with wonder the first to observe them, and every one who sees them for the first time partakes of the same feeling of surprise."

It is apparently not considered good form for a botanist to pay much attention to aesthetic or sentimental matters in his scientific work; but it is to be hoped it will not be considered necessary to suppress what older authors may have done of this kind.

MALDEN, MASSACHUSETTS.

RECORDS OF THE CONNECTICUT BOTANICAL SOCIETY,— I.

E. B. HARGER, Cor. Secr.

THE CONNECTICUT BOTANICAL SOCIETY held four field meetings during the summer of 1905 at Salisbury, Grants, Stratford and Groton.

The first of these was a two-day excursion to Salisbury under the guidance of Mrs. C. L. Phelps. The first day was spent in a trip by wagon from Canaan to Salisbury. Among other points of interest was the original New England station for *Wolffia.* The second day offered the choice of limestone or mica slate country and among the interesting plants noted, were *Rosa blanda,* Ait., *Carex Grayii,* Carey, *Arisaema Dracontium,* Schott., and *Arceuthobium pusillum,* Peck.

The second excursion was on July 9th to see *Rhododendron maximum,* L. in bloom in a swamp near the little station of Grants not far from Winsted. The party was guided by Messrs. Weatherby and Bissell, who had explored the region in advance and had pacified the owner of the swamp by a promise of payment for the proposed trespass. All felt repaid for the outlay of one dollar for the party when the *Rhododendron* was found to be in the full splendor of its bloom. During the trip Mrs. Phelps discovered the second station in the state for *Mitella nuda,* L., and Mr. Bissell collected a quantity of *Carex tribuloides,* Wahl. var. *reducta* Bailey not before reported from the state. Besides these, the members from the southern part of the state were

gladdened by the sight of many unfamiliar plants, notably *Dalibarda repens*, L. and *Lycopodium annotinum*, L.

The meeting at Stratford on Aug. 6th under the guidance of Dr. Eames was notable for the discovery of *Viola pectinata*, Bickn. by Mr. Bartlett and of *Lysimachia producta*, Fern. by Dr. Eames. Many other species of interest were shown by the guide, among them *Triosteum angustifolium*, L., *Viola septemloba*, LeConte, *V. sagittata*, Ait, *Sabbatia stellaris*, Pursh. and *Woodwardia angustifolia*, Smith; while those who knew *Habenaria ciliaris*, R. Br. only from scattered specimens will not soon forget a field which it covered with orange.

At Groton on Sept. 1st with Dr. Graves for guide the party first explored the border of Poquonnoc Lake, where Mr. Bissell discovered *Cuscuta compacta*, Juss. and Mr. Harger *Sagittaria longirostra*, J. G. Smith, both new to Connecticut. Besides these, *Carex oligosperma*, Michx., *Juncus militaris*, Bigelow, *Utricularia biflora*, Lam., *Lycopus sessilifolius*, Gray, and other species of interest were seen. After lunch the party proceeded by trolley to the sea-shore near Noank where they saw *Prunus Gravesii*, Britt., at its type station and *Ligusticum Scoticum*, L., at the limit of its southern range.

The annual meeting was held at New Haven, Jan. 27th, 1906. The former officers were re-elected, *viz*: — President, Prof. A. W. Evans; Vice-President, Dr. C. B. Graves; Secretary and Treasurer, Dr. E. H. Eames; Corresponding Secretary, Mr. E. B. Harger; Member of the Executive Committee, Mr. C. H. Bissell.

Dr. Graves reported on the proposed catalogue of the plants of the state, which he described as well under way and likely to be published this year. Mr. C. H. Bissell then read a paper on the Ferns of Connecticut, treating all species of ferns and fern-allies known from the state and exhibiting specimens. After a report of the Salisbury excursion, the meeting adjourned for dinner. In the afternoon Mr. A. H. Graves of the Yale Forest School gave a résumé of the Trees of Connecticut, showing specimens of each species and giving remarks on the distribution and other items of interest. This was followed by reports of the other field-meetings and an exhibition of specimens collected during the year by members; after which the meeting closed with an hour of informal talk.

Oxford, Connecticut.

Vol. 8, no. 67, including pages 49 to 68 and plates 66 to 70, was issued 27 March, 1906.

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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NOTES ON TRISETUM AND GRAPHEPHORUM.

F. Lamson-Scribner.

The limitations of the larger genera of the tribe *Aveneae* are in no case clearly defined, and the classification of many of the species will always be determined with more or less doubt, resting finally upon the judgment of the agrostologist, rather than upon any definite characters. Some of the smaller genera in the tribe are established upon purely technical or artificial characters subject to more or less individual variation, and at best of questionable taxonomic value. Such are *Aira, Graphephorum*, and *Ventenata*, while one has only to consult the synonymy of the species of *Avena, Deschampsia* and *Trisetum* to discover how varied have been the views concerning them, species resting for a time in one genus only to be shifted by a later author to another, until some have figured for a season in three or even more recognized genera. Botanists have repeatedly attempted to fix upon characters which would sharply outline a genus, and in some cases have sought to attain this result by establishing new genera. *Deschampsia, Danthonia* and *Trisetum* were thus segregated from *Aira* and *Avena*, but with the advancement of our knowledge through the investigation of more abundant material and discovery of "new" species, the generic limits have been broken here and there until we are forced to admit the futility of the attempt, accepting the fact that the different groups or divisions of organic life even to the ultimate specific units, however natural they may appear, present variations which, in one way or another, so connect them together that they present a unity of development wherein genera and species become simply the expressions of the scientist, merely serving to facilitate his efforts in studying the grand scheme of nature.

Specific characters, or those used to define species, are no less variable than the generic, and it is the purpose of this paper to call attention to some of these in a few of our native grasses concerning whose classification there has been some diversity of opinion. A brief discussion of the genera included is necessary to the presentation of the subject.

Trisetum.— Persoon, in 1805, segregated from *Avena* a number of species upon which he founded the genus *Trisetum* with the following characters: "*Cal.* 2–3-florus, acuminatus, carinatus. *Cor.* aristis 2 terminalibus subdentiformibus (glum. apice setoso-bifidis), 1 dorsali recta nec contorta, flosc. ut plurimum glabris. (*Spiculae* compressae, pallescentes.)" [1] The bidentate flowering glumes straight, not twisted, dorsal awns and compressed spikelets were apparently the differential characters. Persoon evidently had some doubts as to the limitations of his genus, for he concludes his enumeration of the species by the observation: "Nonnullae generis *Avenae* species ex. gr. Av. pensylvanica, lupulina et purpurea huc quoque pertinere videntur, quae ulterius examen hinc merentur." *Trisetum palustre* he leaves in *Avena*. Eleven species make up the genus, six of which are now referred to other genera; one, the first described, to *Ventenata*; two to *Danthonia*; and three to *Avena*. The fourth species described, *T. nitidum* Pers., is still retained in the genus, and being the first species for which a figure is cited, must be accepted, according to the opinion of some taxonomists, as the type of the genus.

Seven years later, in 1812, Beauvois[2] takes up *Trisetum*, increasing the number of species to eighteen, only half of which, according to the Kew Index, are now retained in the genus; *Ventenata*, *Danthonia*, *Aira*, and *Avena* claiming seven while two are merely synonyms. It may be of interest to note here that the *Trisetum subspicatum* is the *Aira subspicata* of Linnaeus[3] but was published six years earlier by the same author under *Aira spicata* (Linn. Sp. Pl. **1**: 64. 1753),[4] the name taken up by Richter in 1890 (Richt. Pl. Eu. **1**: 59.) Beauvois apparently had a very clear conception of the genus as it is understood today, and his failure to apply properly his diagnosis, shown by his rather heterogeneous assemblage of species, only seems to

[1] Pers. Syn. **1**: 97. 1805.

[2] Agros. 88, Pl. 18, fig. 1.

[3] Syst. Nat. ed. 10. **2**: 873. 1759.

[4] *Aira spicata* on page 63 of Species Plantarum was changed by Linnaeus in the errata to *Aira indica*.

emphasize the fact already noted, that the element of opinion or judgment plays no small part in the deductions of the keenest observers. That Beauvois was an acute observer of rare judgment his work amply shows, and his diagnosis of *Trisetum,* here quoted, presents all the essential characters embodied in the more pretentious efforts of recent authors. "Axis paniculatus: Panicula composita.— Glumae membranaceae, 3–5-florae, longitudine flosculorum: Palea infer. *biseta, dorso supra medium aristata*: *Arista herbacea, flexuosa, raro plicata.*" He separates *Danthonia* and *Avena* from *Trisetum* by the character of the awn, which in these genera he describes as being plicate and twisted, while *Deschampsia* has the apex of the flowering glume multidentate, with the slender awn inserted near its base. He makes no mention of the relationship of the genus with *Eatonia, Koeleria,* or *Deyeuxia,* and fails to recognize the genus *Ventenata,* published by Koeler (Desc. Gram. 272, 1802).

Beauvois separates *Graphephorum* chiefly by the shortness of the awn: "paleae bifido-dentatae: infer. inter dentes mucronata." Hairiness of the rachilla is common to most species of *Trisetum,* and there are both North and South American species in which the awns are very short or even suppressed entirely. Desvaux (Gay, Flor. Chil. **6**: 352, 1853) forms a section in the genus, Sect. *Koeleria,* to include the species in which the awns are straight, usually short, or sometimes wanting. He includes in this section *Trisetum micratherum* and *T. subaristatum.* Grisebach (In Abhandl. Gesellsch. Wiss. Goett. **24**: 292, 1879) transfers *T. micratherum* Desv. to *Koeleria.* I have seen the grass referred by Philippi (Ann. Univ. Chil. **43**: 568, 1873) to this species, and would retain it in *Trisetum.* It is distinguished from *Koeleria* by its decidedly unequal empty glumes, bearded callus and rachilla, and short subterminal awns. The texture and character of the glumes are like those of *T. Wolfii* Vasey, and the inflorescence is much the same as in that species. Philippi (Ann. Univ. Chil. **94**: 26, 1896) refers his *Trisetum minutiflorum* to the same section — (*Koeleriae*), but this grass is not referable to *Trisetum.* It belongs to the section *Lophochloa* of *Koeleria,* being most closely allied to *K. phleoides* and *K. villosa* Pers.

Trinius (Fund. Agros. 157, 1820.) unites *Trisetum* with *Avena,* but later (Mém. Acad. St. Pétersb. VI, **1**: 59, 1830) he takes up the genus and in his diagnosis describes the flowering glume as "bidentate vel bisubulate, dorso arista vel infra apicem setigera (rarissime mutica)."

He divides the genus into three sections; those species having "perianthiis bidentatis, aristis (setis) abbreviatis" form his section "b," to which he refers *Koeleria villosa* and *K. phleoides* Pers. The third section, which is established with a query, has the flowering glumes awnless. Here he includes *Eatonia obtusata* (Mx.) A. Gray and *E. pennsylvanica* (D.C.) A. Gray, with the remark that the latter is similar to *Trisetum palustre.* It is clear that Trinius recognized the close relationship of *Eatonia* and *Koeleria* with *Trisetum* by uniting these genera with it, although he apparently excluded them a few years later when he published (Mém. Acad. St. Pétersb. VI. **4**^{2}: 10–11, 1836) a more complete diagnosis of the genus, evidently the result of much careful study. He does not appear to have made any reference to *Graphephorum melicoideum*, at least I have failed to discover any, but this grass would certainly fall under *Trisetum* as above characterized.

Graphephorum:— In a memoir upon some new genera of Gramineae published in 1810 (Nov. Bull. Soc. Philom. de Paris, II. **2**: 189) Desvaux established the genus *Graphephorum* upon Michaux's *Aira melicoides*, published in 1803 (Flor. Bor. Am. **1**: 62). Michaux describes his plant as follows:

"A. erecta, glabra, planifolia: panicula parvula, subracematim coarctata: gluma communi partialibusque majusculis, lineari-lanceolatis, muticis; his basi villis cinctis: minutissimo tertii flosculi rudimento pedicellato.

"Obs. Ex secundi flosculi basi nascitur pedicellus longiusculus, villosus, vix perceptibili floris rudimento terminatus.

"Hab. Canada."

Desvaux evidently examined specimens of the grass, probably Michaux's, for he adds some characters in his diagnosis not noted by the author of the species.

"*Graphephorum.* Gluma biflora valvulae acutae integerrimae; glumellae inclusae; valvulae bifidae, appendix interflorus, elongatus, pilosus, pilis secundis. Spiculae paniculatae.

"Graphephorum melicoideum Desv.

"Aira melicoides Michx.

"L'appendice qui characterise ce genre, ne ressemble point à une fleur avortée, c'est un corps tout particulier."

He does not compare *Graphephorum* with *Trisetum*, but separates it from *Aira* by the peculiar character of the prolongation of the

rachilla, which he makes the essential character of his new genus, placing it with *Triodia.*

Beauvois in 1812 recognizes *Graphephorum,* and adds a little to the generic characters without increasing the number of species. He says (Agros. 76): "Flosc. suprem. pedicellato, abortivo, villosissimo.— Paleae bifido-dentatae: infer. inter dentes mucronata." He evidently looked upon the hairy prolongation of the rachilla as an aborted floret, and his specimens showed the minute awn below the teeth of the flowering glume, which character was not manifest in the material examined by Michaux and Desvaux, or was overlooked by them, but which is nevertheless common, the awn often being quite conspicuous.

In 1856, Dr. Asa Gray published (Man. ed. **2**: 556) as new a form of *Aira melicoides* Mich. under the genus *Dupontia,* naming it *D. Cooleyi* and comparing it with *Aira caespitosa* and *Aira bothnica.* Later, having discovered the relation of his grass with Michaux's *Aira melicoides, Graphephorum melicoideum* of Desvaux, he revised the genus *Graphephorum* (Annal. Bot. Soc. Canada, $\mathbf{1}^1$: 55–57, 1861) modifying its characters so as to include the species of *Scolochloa, Dupontia,* and *Colpodium,* reducing his *Dupontia Cooleyi* to a variety of *Graphephorum melicoides,* characterizing it as "a luxuriant form from 2 to 3 feet high with ampler panicles."

There is in the Gray Herbarium a specimen collected by Dr. Cooley in Macomb Co., Michigan, which is doubtless the type of this variety, and in its robust habit and pilose leaves, Gray very naturally failed at first to connect it with the more slender and glabrous plant described by Michaux. This specimen has scabrous leaves which are pilose upon the upper surface, spikelets 6–7 mm. long, unequal empty glumes, the broad 3-nerved second glume nearly equalling the spikelet and the oblong obtuse flowering glumes, which are entirely awnless. The rather stiff hairs on the rachilla are about 1.5 mm. long. This variety is exactly represented in the National Herbarium by 26,222 *J. Macoun,* from Johnston's Harbor, Lake Huron, collected in 1901.

Both Hackel (Engl. & Pr. Naturl. Pflanzenf. $\mathbf{2}^2$: 74, 1887) and Baillon (Hist. d. Plant. **12**: 212, 1894) hold *Graphephorum* as a genus distinct from *Dupontia, Scolochloa,* and *Colpodium;* but regard it as being closely allied to them, placing it with them in the *Festuceae.* This disposition appears to be wholly unwarranted, for there is nothing in common between *Graphephorum* and the genera above named excepting the hairiness about the base of the flowering glume, while there

are striking features suggesting relationship with the *Aveneae* as indicated by the earlier authors. The habit of the plant, the character of the inflorescence, the texture and nervation of the glumes, the inequality and length of the outer ones, the hairiness of the rachilla, and the occasional presence of an awn below the apex of the floral glumes all point to a close relationship with *Trisetum*. The entire absence of the awn in the specimens first described has been the stumbling block apparently, leading various authors to erroneous conclusions. As already noted, the reduction of the awn in length sometimes to a mere mucronate point or even its entire suppression is not uncommon among the *Aveneae*. In *Avena*, the cultivated oat is often awnless; the awns are very variable in *Deschampsia caespitosa*; in *Trisetum filifolia* Scribn. the awns are very short (less than 1 mm.), while in *T. filifolium pubescens* they are well developed (3–4 mm.); *T. muticum* (Thurb.) Scribn. has both short-awned and awnless spikelets; while in *T. montanum* Vasey short-awned forms also occur.

At the Philadelphia meeting of the A. A. A. S. in 1884, Dr. Vasey presented a paper in which he pointed out the close relationship of *Eatonia* with *Trisetum*, concluding with the statement "that *Eatonia* and *Erisetum* are very closely related, and should both be in the section *Avenaceae*, as also should some species of the genus *Graphephorum*." (Bot. Gaz. **9**: 167. 1884) The species of *Graphephorum* referred to by Dr. Vasey were *G. melicoideum* Desv. and *G. Wolfii* Vasey. The relationship of these with *Trisetum* was discussed by the present writer at the same meeting, and published in connection with Dr. Vasey's communication. (Bot. Gaz. l. c. figs. 4–5) The writer here says, quoting a letter from Dr. Vasey: "*Graphephorum melicoides* should be *Trisetum melicoides*; or if a genus (*Graphephorum*) be made for it, it should come next to *Trisetum* or *Avena*, for it is evidently Avenaceous." Here we have the first definite reference of *Graphephorum melicoideum* to *Trisetum*. More recent investigations and present very careful study of the entire subject, aided by the ample material in the National Herbarium, have only served to establish more firmly the conclusions set forth by Dr. Vasey.

Trisetum melicoideum (Michx.) Vasey, Bot. Gaz. **9**: 169, 1894; *Aira melicoides* Michx. Flor. Bor. Am. **1**: 62, 1803; *Graphephorum melicoideum* Desv. Nouv. Bull. Soc. Philom. **2**: 189, 1810; Beauv. Agrost. 76, *Pl. 15, fig. 8*, 1812; Scribn. U. S. Dept. Agr. Div. Agros. Bul. 20, fig. 121, 1900.

A slender glabrous perennial, with flat leaves and open nodding panicles 10–12 cm. long. Spikelets 2–3-flowered, about 6 mm. long, with unequal empty glumes, the broader 3-nerved second glumes about equalling the florets; flowering glumes narrow, oblong, obtuse or imperfectly 2-lobed or 2-toothed, awnless or with a very short awn just below the apex (see figures above cited); paleae about ¼ shorter than the glume, hyaline; callus and joints of the rachilla hairy, the hairs on the rachilla, at least the upper ones, 1.5 to 2 mm. long.

Specimens examined: Mt. Kineo, Maine, *C. E. & A. H. Smith*, 1868; St. Anne des Monts River, Quebec, *O. D. Allen*, 1881; Madeleine River, Quebec, *J. Macoun*, 1882.

Trisetum melicoideum Cooleyi (Gray) Scribn. n. comb.; *Dupontia Cooleyi* A. Gray, Man. ed. **2**: 556, 1856; *Graphephorum melicoides major* A. Gray, Annals Bot. Soc. Can. **1**:[1] 57, 1861; *G. melicoides Cooleyi* Scribn. Mem. Torr. Bot. Club, **5**: 53, 1894.

Lower sheaths pubescent, upper surface of the leaves pilose; flowering glumes 5–6 mm. long, minutely punctate-scabrous, entire at the acute apex, awnless. Otherwise as in the species.

Specimens in the National Herbarium: Orion, Michigan, no. 882, *O. A. Farwell*, 1895; Flint, Michigan, *D. Clark*; Winooski River, Vermont, *C. G. Pringle*, 1877; St. Francis, Maine, no. 187, *M. L. Fernald*, 1893; Western Vermont, no. 1753, *L. R. Jones*, 1899; Gault, Ontario, no. 54, *Wm. Harriot*, 1901; Canada, no. 131, *J. Macoun*, 1871. Shores Lake Huron, Canada, no. 26,222, *J. Macoun*, 1901; Rocky Banks, Lake Huron, *Macoun*, July, 1874.

In the specimen last mentioned the spikelets are 3- to 4-flowered and 9 mm. long; the callus hairs 1–2 mm. long, soft and lax.

A glabrous form from Vermont, collected by Mr. C. G. Pringle in 1876, connects the variety with the species. It has the elongated lower leaves and entire flowering glumes in which the midnerve is sometimes excurrent just below the minutely toothed apex.

TRISETUM WOLFII Vasey, Monthly Report U. S. Dept. Agr. Mar. 156, 1874; Bot. Wheeler Expedition **7**: 294, *Pl. 27, fig. 1, 2, 3*, 1878; *Graphephorum Wolfii* Vasey in Coulter Man. Rocky Mt. Bot. 423, 1885.

A rather slender caespitose perennial, with glabrous culms, flat leaves, and contracted usually densely flowered panicles 10 to 20 cm. long. Sheaths and leaves glabrous or pubescent, varying to pilose. Spikelets 2–3-flowered, 5–7 mm. long, slightly compressed; empty glumes subequal in length, broadly lanceolate, acute, scabrous on the

keel above, the first 1-nerved, the second a little broader and 3-nerved; flowering glumes oblong, minutely erose, dentate at the rounded or imperfectly 2-lobed apex, the first 5 to 6 mm. long, awned on the back a little below the apex or awnless. Palea nearly as long as the glume. Callus and rachilla bearded, hairs short. Awn when present rarely extending beyond the apex of the glume, but varying in length from .5 to 3.0 mm.

Colorado, Idaho, Washington, Oregon, and California. Type locality, Twin Lakes, Colorado.

The typical form of this species, which does not extend west of the Rocky Mountains, is glabrous throughout. It is represented in the National Herbarium by the following specimens: Colorado, no. 693, *Geo. Vasey*, 1868; no. 668, *Hall & Harbour*, 1873; no. 333, *F. E. Clements*, 1896; no. 180, *C. F. Baker*, 1899; no. 1063, *C. L. Shear*, 1896; nos. 1449, 1482, *Shear & Bessey*, 1898; Wyoming, nos. 4013, 4012, *Aven Nelson*, 1897; no. 455, *E. Nelson*, 1901; no. 2617, *T. A. Williams*, 1897; no. 7787, *Aven Nelson*, 1900. Montana, no. 493, *C. L. Shear*, 1905; Utah, no. 4292, *Pammel & Backwood*, 1902.

Trisetum Wolfii muticum (Thurb.) Scribner, n. comb.

Trisetum subspicatum muticum Thurb. in Brew. & S. Wats. Bot. Calif. **2**: 296, 1880; *T. muticum* Scribn. U. S. Dept. Agr. Div. Agros. Bul. **11**: 50, *fig. 10*, 1898.

Sheaths pubescent, often quite densely so, with downwardly directed hairs, leaves pubescent or pilose only upon the upper surface. California, no. 5019, *Bolander*, 1866; Oregon, no. 1314, *W. C. Cusick*, 1886; no. 2333, *Cusick*, 1899; no. 147, *Griffiths & Hunter*, 1902; Washington, no. 949, *W. N. Suksdorf*, 1889; no. 101, *Suksdorf*, 1884; Montana, no. 370, *F. Lamson-Scribner*, 1883; no. 573, *R. S. Williams*, 1890; no. 3080, *P. A. Rydberg*, 1896; Idaho, no. 435, *Heller, Sandberg & McDougal*, 1892; no. 1049, *J. B. Leiberg*, 1895, panicles unusually lax; no. 2812, *C. V. Piper*, 1898 (specimen in Gray Herb.).

Specimens with the lower sheaths finely scabro-pubescent occur throughout the range of the species, connecting the pubescent with the glabrous forms.

The spikelets of *T. Wolfii* are less compressed and the glumes are somewhat firmer in texture than in *T. spicatum molle*, from any form of which it is readily separated by its subequal empty glumes. This latter character, together with the narrower, elongated and densely flowered panicles, at once distinguish *Trisetum Wolfii* from any form

of *T. melicoideum.* From the more nearly allied **Trisetum altijugum** Scribn. n. comb. (*Graphephorum altijugum* Fourn.) by its larger panicles and spikelets which are about 4 mm. long. The panicle of *T. altijugum* resembles that of *Sporobolus indicus.*

Trisetum montanum Vasey, Bull. Torr. Bot. Club, *13*: 118, 1886; *T. alpestre* Vasey, Bot. Wheeler Exped. **6**: 294, *Pl. 27, fig. 4, 5, 6,* 1878 — not *T. alpestre* Beauv. 1812; *Trisetum Shearii* Scribn. U. S. Dept. Agr. Div. Agros. Circ. **30**: 8, 1901; *Graphephorum Shearii* Rydb. Bull. Torr. Bot. Club, **32**: 602, 1905.

Dr. Vasey at first referred this grass to the European *Trisetum alpestre*; later he noted its close relationship with *T. flavescens*, and he says (MS. notes in National Herbarium): " much like *T. flavescens*, but wanting in the color; the leaves are much longer, the spikelets are smaller, the flowering glumes much more acuminate, the awns shorter and less twisted." The specimens of the Wheeler Expedition (no. 669, *J. Wolfe*) are about 2.5 dm. high, with rather densely flowered panicles 6–8 cm. long. Robust specimens 6–10 dm. high, with more open panicles 10 to 20 cm. long, are represented in the National Herbarium from Idaho Falls, no. 720, *C. L. Shear*, and nos. 2481, 2484, 2491, *P. A. Rydberg*, 1895. It is difficult to separate these from *T. flavescens*, the most obvious difference being in the awn, which is straight or simply divergent in *T. montanum*, while in *T. flavescens* it is twisted below and distinctly geniculate. The glumes, especially the flowering ones, are a very little broader in the last named species.

The lower sheaths and leaves vary from being entirely glabrous to pilose or pubescent, as in no. 2479, *P. A. Rydberg*, and no. 718, *C. L. Shear*, 1895, both from Idaho Springs. Other specimens with the lowermost sheaths pubescent come from Las Vegas, New Mexico, collected by *G. R. Vasey*, and from Garland, Colorado, no. 71, *C. L. Shear*, 1900. Variations in the length of the awn occurs in this as in other species of *Trisetum*, and the color varies from pale silvery green to purplish shades, the shortening of the awn occurring in the latter, being especially manifest in no. 1214, *C. L. Shear*, from Silverton, Colorado, specimens that were at first regarded as representing a distinct species (*T. Shearii* Scribn.). Other specimens showing intermediate characters occur connecting the short-awned forms with the longer awned types.

The distribution of *Trisetum montanum* appears to be limited to the mountain regions of Colorado and New Mexico.

Washington, D. C.

SOME ANOMALOUS PLANTS OF TIARELLA AND MITELLA.

M. L. Fernald.

The occurrence, at least in the wild state, of inter-generic hybrids is so unusual that the following instances of what seem with little question to be hybrids between *Tiarella cordifolia* and species of *Mitella* are worthy special record and closer observation in the field.

My attention was recently called to the existence of these plants by the receipt from Mr. J. M. Macoun of a sheet of specimens collected by his father, Professor John Macoun, on rocks in a ravine near Eel River, New Brunswick, on August 29, 1899. The plant which suggested to Professor Macoun the long-lost, and never rediscovered, *Mitella prostrata* described by Michaux from Lake Champlain, is in aspect like a freely stoloniferous plant of *M. nuda*, in the rounded lobes of the leaves and the very slender stolons inseparable from that plant. Its inflorescences, borne irregularly at the tips of the leafy flagelliform stolons are quite unlike those of *M. nuda*, but in their short oblong outline suggest the racemes of *Tiarella cordifolia*. The flowers, too, are structurally similar to those of Tiarella: the petaloid calyx free from the subulate capsules which vary from 1 to 3 and are apparently quite empty and inclined to shrivel without enlarging; the petals when present linear-spatulate and entire or ciliate-margined, rarely exceeding the sepals; the stamens as in *Tiarella*, and varying from 5 to 10. The stolons bear numerous reddish deeply lacerate stipules which sometimes subtend normal leaves, and again bear in their axils minute subulate bodies resembling the pistils of the racemose flowers; and in the racemes many of the flowers are subtended by the conspicuous ciliate-fimbriate bracts which are much larger and more freely cleft than the bracts in normal *Tiarella*.

From the above description it will be seen that the Eel River plant is aberrant in many regards. With the habit of *Mitella nuda*, it has flowers which structurally suggest *Tiarella cordifolia*, though the petals are sometimes ciliate, a character which suggests the fimbriate petals of *Mitella*. The sterility of the plant, and its eccentric habit of flowering from the tips of the stolons at the end of August, instead of in early summer when both *Mitella nuda* and *Tiarella cordifolia* are normally

in anthesis,[1] indicates, in connection with its other characters, that the anomalous plant from Eel River is a probable hybrid between those two species, both of which abound in the St. John Valley.

Another plant which seems to be a hybrid of *Tiarella cordifolia* and a species of *Mitella* was noted by Dr. Gray[2] in 1886, although that fact seems to have been overlooked in two recent extended publications on the North American *Saxifragaceae*,[3] where another probable hybrid, between *Mitella diphylla* and *M. nuda*, is recognized by both authors, by Dr. Rydberg as *M. intermedia* Bruhin; by Dr. Rosendahl as *M. diphylla*, forma *intermedia*, with the suggestion as already made by Mr. Bruhin in a letter to Dr. Gray that the plant is a hybrid. The plant referred to by Dr. Gray in the Bulletin of the Torrey Botanical Club has the aspect of a small-flowered *Tiarella* with unusually rounded leaves, and the small petals are more or less lacerated. This plant which was thought by Dr. Gray to be a possible hybrid of *Tiarella cordifolia* and *Mitella diphylla* is represented by two sheets in the Gray Herbarium, one from Williamstown, Massachusetts (coll. *Sanborn Tenney*), the other from Wilton, New Hampshire (coll. *M. A. C. Livermore*).

Since the parents of these supposed hybrids are all common in many portions of New England and eastern Canada it is hoped that the above notes will stimulate those who have opportunity to watch them in the field to observe whether this tendency to inter-generic hybrids is more common than we suppose, and, more important still, whether these plants, as seems to be the case, are always sterile.

Another plant which should be sought by northeastern botanists is *Mitella prostrata* Michx. discovered by Michaux more than a century ago near Lake Champlain, but so far as we know not since detected. This was originally described as

M. "PROSTRATA. M. radice repente; caulibus prostratis, alterne foliosis: foliis rotundato-cordatis, subacutis, obtuse sublobatis.

Hab. ad fines meridionales Canadae."[4]

This plant was taken by Torrey and Gray to be a peculiar extreme

[1] *Tiarella cordifolia* flowers regularly in late spring and early summer, and rarely if ever produces autumnal flowers. *Mitella nuda*, on the other hand, is inclined to produce flowers somewhat erratically throughout the summer and autumn, though its season of profuse blooming is in late spring and early summer.

[2] A. Gray, Bull. Torr. Bot. Cl. xiii, 85 (as insert), 100 (1886).

[3] Rydberg, N. A. Fl. xxii. pt. 2, (1905); Rosendahl in Engler, Bot. Jahrb. xxxvii. Beibl. 83 (1905).

[4] Michx. Fl. i. 270 (1803).

of *M. nuda*: "β. creeping shoots assurgent at the extremity, bearing a terminal raceme";[1] and subsequent authors have very generally considered the plant a phase of *M. nuda*, while both Doctors Rydberg and Rosendahl in their monographs reduce it to unquestioned synonymy as identical with that well-known northern species.

Michaux's specimen at the Muséum d' Histoire Naturelle in Paris, however, shows that, while the plant is an undoubted *Mitella*, it is far from identical with *M. nuda*. The sheet, bearing besides analytical notes the inscription in Michaux's hand "*Mitella prostrata*. Lac Champlain," shows a plant as coarse as *M. diphylla*, with a thickish subterranean creeping rhizome, but no slender stolons as in *M. nuda*; the leaves strongly angulate-lobed as in *M. diphylla*; and the ascending flowering-stem 3.6 dm. high (taller than most *M. diphylla*) and bearing 4 very remote alternate leaves, the two lower strongly angled and long-petioled, the two upper scarcely angled and subsessile. The raceme is very long-peduncled (6 cm. long), though a remote solitary flower is borne from the axil of the uppermost leaf. In general the inflorescence suggests that of *M. diphylla*, but the pedicels, 3–6 mm. long, are much longer than in that species, in which they are normally from 1.5 to 2.5 mm. long. In these rather long pedicels alone does the Michaux specimen of *M. prostrata* approach the more slender round-leaved scapose *M. nuda* to which it has too long been referred; but in the long pedicels as well as in its remote alternate leaves it strongly suggests Nuttall's *M. caulescens* of the Northwest. That clearly-marked species, however, has the pedicels strongly divergent while those of *M. prostrata* are as strongly ascending.

This detailed account of Michaux's original specimen of *Mitella prostrata* is here included not because, as in the case of the first two plants discussed in these notes, it is an apparent hybrid, but because it is evidently a lost species. Whether it is a plant genetically distinct from both the well-known eastern species it is now impossible to say; but the definition of the type-region, "ad fines meridionales Canadae," supplemented by Michaux's manuscript record "Lac Champlain," is sufficiently clear; and the Champlain Valley is being explored by botanists too keen and discriminating to overlook *Mitella prostrata* if, as in Michaux's day, it still grows near the border of Vermont.

Gray Herbarium.

[1] T. & G., Fl. i. 586 (1840).

SOME NOTES ON OUR YELLOW CYPRIPEDIUMS.

Ora W. Knight.

Though the extreme forms of our native yellow Cypripediums have been recognized as species under the names *Cypripedium pubescens* Willd. (Sp. Pl. **4**: 143. 1805) and *C. parviflorum* Salisb. (Trans. Linn. Soc. **1**: 77. 1791) I have long doubted their specific distinctness. Study of the plants growing in the field and also of some under cultivation in the garden would seem to prove that we have at best a species, *C. parviflorum Salisb.*, which would appear to be our small flowered plant which has commonly passed under this name, while the larger flowered form would appear to require the name, *Cypripedium parviflorum* var. **pubescens**, in order that its exact relationship be better expressed.

On May 30, 1901, Mr. F. M. Billings found a clump bearing eleven flowering stalks which could be referred under the descriptions in the current manuals to no other species than *Cypripedium pubescens.* They agreed perfectly with the descriptions in size of flower, compression of lip, shape of foliage and all the characters except color of the blossoms which were bright, not pale yellow. These plants were growing in very rich soil in low shady woods. A portion of the plant was pressed and three flowers from it are now in my herbarium. Mr. Billings transplanted part of the cluster into his garden, putting them into less rich soil and in a sunnier spot than where they naturally grew. In 1905 the characters of these plants were so far changed that they would pass very well for the small-flowered plant, *Cypripedium parviflorum.* The whole plant had become shorter and slenderer with narrower foliage, the lips of the flowers less than an inch in length (some were two inches at time when transplanted), lips not appreciably flattened laterally and in fact not any longer possessing the characters of the large-flowered plant.

During the past few years I have annually transplanted into my garden clumps of a plant which agreed in all essential characters with the *Cypripedium parviflorum* of the manuals, save that in most instances the blossoms were pale yellow, not bright yellow, as called for by the descriptions, but some plants had bright yellow blossoms though not otherwise differing. The plants longest growing in the garden (about five years) have increased in size, have larger broader foliage, flowers with lips up to one and three-quarters inches long which are deeper

yellow colored; and in fact many have the essential characters of what has passed as *C. pubescens*, while others not so long in the garden do not show quite so great a change. My plants were originally growing in moss in a cold bog, and did not blossom until past the middle of June, many not until the first of July. I transplanted them into very rich soil in a sunny locality, and now the earliest bloom sometimes by the third week in May, and even plants which were transplanted the year before are in bloom by June first. All the plants bear increased numbers of flowering stalks, and nearly all the stalks bear two flowers where originally it was very rare to find more than one on a stalk. One season two stalks from the same plant bore flowers whose lip on one stalk was laterally compressed while on the other it was strongly compressed from above, there being one flower on each of these stalks.

While studying the plants in their natural habitat in Maine I have repeatedly found many which were intermediate in characters between *Cypripedium parviflorum* and *C. pubescens* and in most instances plants readily referable to one or the other form (sometimes both forms) were growing with these intermediates. In both the large-flowered and small-flowered plants I have seen flowers both pale yellow and deep yellow; both with fragrant and odorless flowers, some with ovate sepals, others with elongated lanceolate ones; some broad-leaved, others narrow leaved; some with sepals and petals decidedly brownish-purple, others not so; in fact almost every combination of characters.

The dwarf, small-flowered plant of the Rocky Mountain region which is sometimes not more than six inches high and with lip not more than half an inch in length seems very distinct from either of ours until some essential character besides size is sought for, at which stage there seems to be no other differential characters. Taking the two plants as found in the East, the extremes seem very different; but the characters given in the manuals do not hold good for each form. Even Gray's Manual, 6th ed., p. 511, states at the end of the description of *C. parviflorum*,—"Flowers fragrant; sepals and petals more brown-purple than in the next, [referring to *C. pubescens*] *into which it seems to pass*" (italics mine).

The characters ordinarily given in descriptions fail to serve as an absolute means of separation of the two plants, and unless the numerous specimens possessing characters of both forms can be accounted for on the grounds of hybridism we ought to regard them as different phases of the same species.

Bangor, Maine.

TWO NEW SPECIES OF RUBUS FROM VERMONT AND NEW HAMPSHIRE.

W. H. Blanchard.

Of the new species of Rubus, here described, both belong to the high blackberry series. The first is a rather small and delicate species, glabrous and glandless, with dark green leaves, small, early fruit, and slender, strong, and often numerous prickles. The second is noteworthy for its large and abundant fruit which is of excellent flavor. The species may be characterized as follows:—

Rubus elegantulus, n. sp. Plants from two to four feet high, very erect and pretty.

New canes. Stems very erect, 2 to 4 feet high, glabrous, red, well angled and furrowed, rather small. Prickles on the angles only, slender with a slight backward slant, strong and waspish to handle, about 12 to the inch of stem on typical plants but often less. Leaves thin, small, 5-foliate, dark green above and slightly lighter below, perfectly glabrous, or sometimes slightly hairy above and pubescent below, but not appreciably so to the touch or to the unaided eye. Leaflets oval, long taper-pointed; outline entire, finely and doubly serrate-dentate, the middle one rather broad with rounded base and twice as long as wide, the others wedge-shaped at the base and narrow. Petiole and petiolules grooved above with three rows of hooked, slender, short and strong prickles, the petiolule of the middle leaflet $\frac{3}{4}$ of an inch long, those of the side leaflets less than half as long, the basal leaflets sessile.

Old canes. Erect as ever, prickles but little impaired, the cane pyramidal in shape as in all true high blackberries. Growth of second or bearing year consisting of leafy branches below; above of racemes leafy at the base with a straight axis, not a leafy branch tipped with a raceme, one from each old leaf axil, or in many cases from two to four leafless racemes. Inflorescence with a fine pubescence or none; peduncle slender, pedicels very slender generally set at a great angle to the axis, 10- to 16-flowered, bracts small. True branches small, 6 to 10 in. long, zigzag, nearly terete, glabrous, prickles hooked; leaves 3-foliate at the base, leaflets broad and short-pointed; terminal ones 5-foliate like those on new canes, all similar in color, texture and serration to those on new canes. Leaves on racemes proper more coarsely serrate-

dentate, 3-foliate, a few sometimes unifoliate, small on the upper ones, larger on those below. Flowers 1 to 1½ in. broad, petals long-oval at least twice as long as wide with no apparent claw. Fruit nearly globular, ¼ to ⅜ in. in diameter, or on strong plants cylindric and larger, sweet, drupelets black and rather larger than those of *R. nigrobaccus*, Bailey. Flowers early in June and fruits early in August, productive.

Type stations: Signal Hill and its northern borders in Alstead, Cheshire County, N. H., being midway between Alstead Center and Beryl Mt., Acworth; Thompsonburg in Londonderry, Athens, Stratton and Windham in Windham County, Vt. Range as now known to me; Southwestern New Hampshire and Southeastern Vermont. Elevated situations in open places on dry ground. Numerous specimens have been deposited by me in the Gray Herbarium and in that of the N. Y. Botanical Garden.

This pretty species which seems to be distinct from anything yet described, I first found July 4, 1902, in Athens, Vt., on Bemis Hill and I have watched it each season since. It grows in elevated situations not occurring in the towns bordering on the Connecticut River. To be specific, I have found it often abundant in Athens, Grafton, Jamaica Londonderry, Stratton, Wardsboro and Windham, Vt., and in Acworth, Alstead and Langdon, N. H., an east and west range of forty miles. It blossoms and fruits the earliest of all blackberries in the localities in which it grows.

It is readily distinguishable from the other high blackberries by its prim appearance, early fruiting and numerous slender prickles; from the recurving class by its narrow leaflets and erect and furrowed stem; and from the *setosus* class by its strong prickles, lack of glandular hairs and all the other characteristics mentioned in this paragraph.

Rubus pergratus, n. sp. Large, erect plants more or less pubescent, and nearly, or quite glandless, producing an abundance of large, short-cylindrical, very edible fruit.

New canes. Stems erect, 3 to 6 feet high, large and strong, red and glabrous, angled and furrowed. Prickles few, short, about ⅛ in. long, strong, stout, 2 to 8 to the inch of stem, set at nearly a right angle to it and on its angles only. Leaves of good size, often large, 5-foliate, dark yellow-green and nearly glabrous on the upper surface, lighter on the lower surface and pubescent. Leaves long-stalked, oval, often broad-oval, the middle one sometimes ovate or nearly orbicular and a trifle cordate, outline entire, finely often doubly serrate or serrate-

dentate, taper-pointed, rounded at the base or the basal leaflets broadly wedge-shaped. Petiole and petiolules stout, grooved above, nearly or quite glabrous, glandless, with a few hooked, strong prickles; the petiolule of the middle leaflet 1 to 1½ in. long, those of the side leaflets over one-half as long, the basal leaflets never sessile.

Old canes. Still erect, pyramidal, the prickles intact. Second year's growth consisting of nearly leafless racemes at the top of the stem, succeeded downward by racemes leafy at the base, and these in turn succeeded by pure leaf branches. Stems of leaf branches irregularly angled, 8 to 12 in. long, more or less pubescent, even woolly on some, prickles small and hooked; leaves 3-foliate at the base of each branch, 5-foliate beyond, resembling those on the new canes, but broader and more pubescent. Racemed branches or fruit branches with a stout axis, irregularly angled, pubescent or woolly, prickles short and recurved; leaves 3-foliate and unifoliate; leaflets very broad and pubescent, coarsely serrate-dentate; about 8 to 12 stout pedicels, very pubescent often woolly with sometimes a stalked gland, set at a moderate angle to the axis, subtended by small bracts; raceme broadest at its top. Naked racemes similar. Flowers large and showy, 1¼ to 1½ in. broad, petals wide, width two thirds of the length, opening the middle of June. Fruit very large short-cylindric, drupelets large and pulpy, sweet; seeds small and unnoticeable. Very productive. Resembles some cultivated kinds. Ripe early in August.

Type station Alstead, N. H., one mile east of Signal Hill. Abundant there and in the elevated parts of Windham County, Vt.

Two other stations where I have found it very abundant and perfect are the lower slopes of Glebe Mt., Londonderry and in South Windham, Vt., though I have found it equally perfect in many other places. It shows its characteristics best in open sun while in moist, rich shade where it grows very tall and leafy its distinguishing features are somewhat obscured.

This blackberry which I have been watching since 1902 closely resembles *some* of those now in cultivation. It is called by the people living where it grows the "square blackberry," and the "short blackberry," in distinction from the "long blackberry" and the "sheep-teat" and "sow-teat," three well-known names for *R. nigrobaccus*, Bailey. In the immediate valley of the Connecticut River where I live, *R. nigrobaccus* is very abundant and is the only "high" blackberry the people know; but as you get away from the river and into more ele-

vated sections it becomes less common and less productive, and berry pickers resort to the square blackberry. This in still more elevated sections becomes scarce and the mountain blackberry, *R. canadensis*, often called the "sour blackberry" is the common kind.

At the type station in Alstead, N. H., *R. pergratus* and *R. nigrobaccus* grow in perfection side by side and the former ripens two weeks the earlier. It is an exact match for the cultivated fruit sold in Bellows Falls, Vt., where it is marketed. With its large drupelets the seeds are hardly noticeable while the fruit of *R. nigrobaccus* with often 100 drupelets is characteristically "seedy," but its peculiarly aromatic taste nevertheless makes it the king of blackberries. I have deposited an abundant supply of specimens of this species in the Gray Herbarium.

Westminster, Vermont.

SOME NEW RECORDS OF MAINE PLANTS.

Ora W. Knight.

Eriophorum polystachion L. In Prof. Fernald's recent article on North American Species of Eriophorum, Rhodora, May, 1905, p. 89, he does not give this species as found southwest of Nova Scotia and New Brunswick, all Maine specimens being referred to the variety *elatius* Bab. Some slender specimens which I collected at Veazie, June 10, 1905, where they were growing in a wet meadow, have been referred to the species by Prof. Fernald thus giving it a place in our flora.

Eriophorum viridi-carinatum fellowsii Fernald. I am able to record this from the second known Maine station, having collected it on a wet springy slope at Charleston, July 4, 1905. This was the only form growing in this locality.

Iva ciliata Willd. This does not appear to be recorded from Maine. Several plants were growing in a dump near Bangor and were collected by Mr. F. M. Billings and myself on October 6, 1905, at which time they were just in bloom.

Ceanothus americanus L. There seem to be no recent records of this plant being collected in Maine. We have known a station by the Penobscot River near Bangor for several years, and July 30, 1905, Mr. Billings found another station for the plant, also on the river-bank some half a mile from the first station.

Heracleum sphondylium L. Mr. Billings and I found lusty plants of this growing in the rear of a warehouse on a wharf along the water front, Bangor, July 8, 1905.

Chenopodium polyspermum L. We collected it in sandy soil at edge of a wharf on the same day as the preceding species.

Galium mollugo L. Very abundant at one station, Bangor.

Andromeda ligustrina Muhl. I collected this on a "floating bog" at Pittsfield which is very near its northeastern limit of distribution in Maine. It is common the other side of the Kennebec River.

Physocarpus opulifolius Maxim. I collected this in a thicket near a brook, June 30, 1905, in Brewer. Years ago Aaron Young collected this, as shown in the Gray Herbarium, on "Banks of streams, Bangor" but we have been unable to find his original station and are rather inclined to believe the plant has been exterminated by cultivation.

Datura stramonium L. Mr. Billings found a few plants in newly deposited ballast along the Maine Central Railroad near Bangor, Aug. 26, 1905.

Bidens beckii Torr. Mr. Billings found one plant in bloom at Pushaw Pond in August, and I collected sterile material later on but could find no flowers. The plants were very numerous in a small sluggish brook.

Sedum acre L. One plant growing by roadside, Bangor, July 16, 1905.

Saponaria vaccaria L. Several plants were collected by Mr. Billings along shore of river, Bangor, July 15, 1905.

With the exception of the *Datura*, *Bidens*, *Saponaria* and *Sedum*, specimens of all the plants have been submitted to Prof. Fernald for verification, and my thanks are due him for his kindness.

Bangor, Maine.

Remarks upon Mr. House's Paper on Pogonia verticillata.— In a recently published paper on Pogonia [1] Mr. H. D. House takes the opportunity of correcting some statements in regard to the underground parts of *Pogonia verticillata*. This author considers the descriptions of the roots, as given in systematic literature "scanty or misleading" and claims the discovery of a "perennial, horizontal rhizome" in this species. He also maintains that "the roots become rootstocks"! The latter observation would, if true, be a most startling discovery, but in regard to the matter Mr. House has certainly mistaken the horizontal roots for rhizomes. What he attempts to describe is quite clearly the occurrence of root-shoots, which have already been described and figured as characteristic of this species as well as of *Pogonia ophioglossoides* and of several other orchids.[2] When Mr. House, furthermore, states that the stem of Medeola, with which this Pogonia often grows associated is green and glabrous, while that of the Pogonia is purplish and covered with a white "tomentum," it is to be pointed out that it is the Pogonia which is glabrous, and the Medeola of which the stem is clothed with flocculent-deciduous wool.— Theo. Holm, Brookland, D. C.

[1] Rhodora, Jan. 1906, p. 19.
[2] Holm Theo.: *Pogonia ophioglossoides* Nutt. A morph. and anat. study. (Am. Journn. Sci., Jan. 1900, p. 13.)

[Some days after the above communication came to hand, corrections of similar import were also received from Mr. House, himself.— Ed.]

Vol. 8, no. 88, including pages 69 to 80 was issued 6 April, 1906.

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Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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PARONYCHIA ARGYROCOMA AND ITS NEW ENGLAND REPRESENTATIVE.

M. L. Fernald.

One of the plants most familiar to all botanists who explore the White Mountains is the closely matted silvery-white perennial which is called in our floras *Paronychia argyrocoma.* In certain sections, as in Crawford Notch and on some of the mountains of adjacent Maine, the plant abounds on slides and even on exposed ledges and steep embankments seemingly to the exclusion of other vegetation. Notwithstanding its profusion in some districts, the plant seems to have been missed by Menasseh Cutler, William Dandridge Peck, Jacob Bigelow, and other New England botanists in their explorations of the White Mountains; and its first mention is apparently that of William Oakes who wrote:

"This beautiful plant was probably first collected in the Notch of the White Mountains, by Drs. Chapman and Alexander, in the summer of 1843. In the same year, I found it in the gravel of many of the recent slides of the Notch, and Mr. Tuckerman has since found it in unmoved soil on a flat rocky knoll, near the summit of Mount Crawford, several miles distant from the Notch. It has not been found elsewhere north of Virginia." [1]

Gradually the known stations in New England for *Paronychia* have increased, and we are now acquainted with it from the mountains of Oxford County, Maine, west through the Crawford Notch region to Mount Clinton, and south to Mount Chocorua. In June, 1884, a singularly isolated station for the plant was found by Dr. Castelhun

[1] Oakes in Hovey's Mag. xiii. 217 (1847).

by the Merrimac River near Newburyport, Massachusetts, indicating that the plant has possibly washed down from some unverified station at the headwaters of the Merrimac.

Outside this very restricted area *Paronychia* is unknown in the Northern States. Since its discovery in Crawford Notch in 1843, it has, however, been supposed to be identical with the plant of the South described by Michaux as *Anychia argyrocoma*, "in rupibus montium superioris Carolinae,"[1] and afterward taken up by Nuttall as *Paronychia argyrocoma* and stated to grow "on rocks, in the mountains of upper Carolina, and on the banks of French Broad river, in Tennessee, near the thermal springs."[2] Subsequently the plant of the South has been found at various mountain-stations of North Carolina and Tennessee, locally south in the mountains of Georgia, and north to the Peaks of Otter in western Virginia.

In the region between the Blue Ridge of Virginia and the White Mountains of New Hampshire *Paronychia argyrocoma* is unknown (save at the small isolated station near Newburyport); yet, as already implied, the plant of the South is as characteristic of many dry summits and slopes at the southern extremity of the Appalachian system as is its northern representative in the White Mountains. North of the White Mountains the plant is quite unknown, nor does it occur in the polar regions. In fact, the genus *Paronychia* does not belong to the arctic flora which we find so generally represented on the exposed slopes of the White Mountains; instead, it is a genus confined primarily to the warmer temperate regions, in North America thirteen species occurring south of latitude 35°, and only one as far north as New England.

This very evident affinity of a typical plant of the naked slopes of the White Mountains with a distinctly southern flora is, so far as known to the writer, quite without parallel. In many cases typical White Mountain plants are also known at the highest altitudes in the Southern States, as for instance *Arenaria groenlandica, Lycopodium Selago, Potentilla tridentata*, and *Pyrus americana* above 6000 feet on Roan Mountain, North Carolina; but in northern New England and adjacent Canada these plants are often as abundant at sea-level as at high altitudes, and in their broad range they occur extensively in polar

[1] Michx., Fl. i. 114 (1803).
[2] Nutt., Gen. i. 160 (1818).

regions. Another typical plant of the White Mountains and of some exposed ridges in central and western Maine, *Geum Peckii*, has by some botanists been taken for an extreme form of the very local *G. radiatum* of the highest summits of North Carolina and Tennessee, and though the White Mountain plant is undoubtedly nearly related to the Carolinian species, both it and *G. radiatum* are more closely allied to certain polar species (of Alaska and Siberia) than to other American plants.

This digression from the discussion of *Paronychia argyrocoma* itself is sufficient to show, as already stated, that the occurrence over a considerable area of the granitic mountains of New England of this representative of a characteristic southern genus is unique; and one is naturally led to ask whether, indeed, the plants of the South and the North are identical. Superficially they are very similar; yet in examining a large series of specimens one is struck with the fact that in the northern plant most if not all the ascending branches bear inflorescences, while in the southern plant many of the branches are merely leafy and sterile. In the southern plant, too, the leaves are flat and permanently covered with grayish silky hairs; in the northern the leaves are inclined to be involute at the margin and glabrate, though in the Newburyport specimen the pubescence is somewhat persistent. In the southern plant the inflorescence is more inclined to be glomerulate than in the northern, though occasional southern specimens show the looser cymes which are characteristic in the North. The only other character in which a distinction has been found is likewise an inconstant one; yet in a series of specimens there is a very apparent tendency in the northern plant to have a slightly shorter calyx than the southern, and the subulate awns nearly or quite glabrous; while in the longer calyx of the southern plant the awns are flattish and usually hairy.

It is apparent, then, that the two plants which have been passing as *Paronychia argyrocoma* are not strictly identical. Their distinctive characters are, however, somewhat inconstant, and only by its narrower glabrate leaves can the northern plant be clearly separated from the southern. In view of this character of the northern plant and the other tendencies which are found in most of the material it seems desirable to distinguish it as

Paronychia argyrocoma (Michx.) Nutt., var. **albimontana**, var. nov. Dense caespitosa; ramis plerumque floriferis; foliis glabratis,

margine involutis; cymis saepe laxis; calycibus 3.5–4 mm. longis, sepalis apice aristato-mucronatis, aristis subulatis glabrescentibus.— MAINE, clefts of rock, summit of White Cap Mt., Rumford, 1874 (*Cora H. Clarke*), August 1, 1889 (*J. C. Parlin*); mountain-top, Andover, 1902 (*Mrs. E. Schneider*); summit, Caribou Mt., Mason, 1898 (*L. A. Lee*): NEW HAMPSHIRE, slides, Mt. Clinton— TYPE (*E. Tuckerman*); Crawford Notch, 1843 (*Dr. Chapman, Wm. Oakes*), July 20, 1865 (*Wm. Boott*), July 7, 1878 (*E. & C. E. Faxon*); open summit and slides, Mt. Willard, July, 1889 (*M. L. Fernald*), July 4, 1889 (*E. & C. E. Faxon*), July 10, 1894 (*E. F. Williams*); Willey Slide, July 3, 1898 (*J. M. Greenman*); Willey House, July, 1871 (*F. Lamson-Scribner*), September 8, 1893 (*E. & C. E. Faxon*); crevices of rocks on mountain slides, North Conway, 1865 (*F. J. Bumstead*); crevices of rock, summit, Mt. Chocorua, July, 1894 (*B. L. Robinson*): MASSACHUSETTS, by Merrimac River, near Newburyport, June, 1884 (*Dr. Castelhun*).

GRAY HERBARIUM.

NEW SPECIES, ETC., ISSUED IN THE PHYCOTHECA BOREALI-AMERICANA.

F. S. COLLINS.

THE first fascicle of the Phycotheca Boreali-Americana, by Collins, Holden & Setchell, was issued in February, 1895. Between that date and the present time the writer has distributed in that work a number of new species, varieties, and forms; in some cases the MS. name was given in the label, with an indication of where the description would be published; in other cases a regular description was printed in the label. Several of these descriptions have since appeared elsewhere in papers or notes, but in most cases the new species or variety has not been published elsewhere. While no rules as to the nomenclature of thallophytes were adopted at the recent Vienna Congress, it is probable that when action is taken in regard to such plants, the rules governing the higher plants will be adopted, unless special reason appear for variation; and as the issuing of a new flowering plant in a set of exsiccatae, with or without description, is not now a valid publication, the position of an alga so issued is certainly precarious. To prevent possible future complications, the descriptions in question are here

reprinted; if the rule for higher plants should be extended to the lower, this article would be the original reference. As far as known, there has been as yet no subsequent publication under another name of any plant here included. The description is copied exactly from the label, any comment or addition that may seem necessary being given in a foot-note; the only change has been in the case of a few of the earlier publications, where varietal and formal names have been changed to conform to the rule of agreeing in gender with the name of the genus. The Arabic numeral preceding a name sufficiently indicates the fascicle, all with such numbers having been issued 50 numbers to a fascicle, from Fasc. I to Fasc. XXVI; a Roman numeral indicates the series in larger size, 25 numbers to a fascicle, Fasc. A to Fasc. D.

1160. **Oscillatoria salinarum**, n. sp. Trichomes somewhat flexuous, sometimes coiled in a regular circle, very torulose; extremity attenuate, slightly curved, obtuse. Articulations nearly or quite as long as broad, diam. .004 mm. or slightly less; calyptra wanting. Ditches of salt works, Salinas Bay, near Guánica, Porto Rico, June 29, 1903. *M. A. Howe.*

707. **Schizothrix Simmonsiæ**, n. sp. Forming a brownish tufted coating on various algae, tufts one or two centimeters long, mass showing reddish brown when moistened, pinkish under the microscope. Trichomes pale green, .003–.006 mm., articulations one-third to one-fifth the diameter, much constricted, sometimes irregularly swollen and distorted, as if doubling up in sheath. Sheath delicate but distinct, containing mostly only a single trichome, but often with a few at the base. Near *S. tinctoria* (Ag.) Gomont, but differs by the larger diameter of trichome, relatively shorter cells, and fewness of trichomes in sheath. Moreover it grows attached to undoubtedly marine algae, while *S. tinctoria* is strictly fresh water. On algae in high rock pool, Easton's Point, Newport, Rhode Island, Dec., 1897. *Mrs. W. C. Simmons.*

1168. Calothrix crustacea Thuret forma **prolifera** (Flah.), n. comb. *C. prolifera* Flahault in Bornet & Flahault, Revision des Nost. Het., part 1, p. 361, 1886. The branches occasionally issue from below a heterocyst, as described for *C. prolifera*, but much the greater part of the filaments are simple, and agree with *C. crustacea*. Among other algae, on boards wet with salt water, Alameda, California, Jan., 1904. *N. L. Gardner.*

1263. Spirogyra porticalis (Müll.) Cleve forma **minor**, n. f. Filaments about .042 mm. diam.; spores seldom over .035 mm. diam. Among other (sterile) Spirogyras, Brookfield, Connecticut, May 8, 1892. *Isaac Holden.*

1265. Tetraspora gelatinosa Kütz. forma **uniformis**, n. f. Forming rounded gelatinous masses, not over 3 cm. diam. Cells quite uniformly .006–.008 mm. diam., not with large and small cells

intermixed, as in the type. Floating in a water trough, Berkeley, California, March 4, 1905. *N. L. Gardner.*

1267. Enteromorpha micrococca Kütz. forma **bullosa**, n. f. Habit exactly like *E. intestinalis f. bullosa* Hauck, Phyk. Univ., No. 519, but structure of *E. micrococca.* In fresh water creek emptying into ocean, but water never other than fresh, San Leandro, Alameda County, California, June 24, 1902. *W. J. V. Osterhout & N. L. Gardner.*

1185. **Prasiola Gardneri**, n. sp. Fronds light green, floating, of irregular form, membrane very delicate, about .006 mm. thick, cells roundish, .003–.004 mm. diam., closely set, in longitudinal and transverse series. As this plant has been found only floating, nothing is known of the normal form or mode of attachment. The cells being uniformly placed, without the "passage ways" characteristic of *Prasiola*, the plant might with some reason be placed in *Monostroma*; and when the attached frond is found, it may have characters requiring the transfer. In the meantime, the general appearance seems to justify its present position. Floating in a pool of very salt water, Alameda, California, Sept. 16, 1903. *W. J. V. Osterhout & N. L. Gardner.*[1]

664. **Chaetomorpha Californica**, n. sp. Filaments attached, erect, up to 2 dm. long, of uniform diameter throughout, not contracted at the nodes; diameter .02–.04 mm., cells once to twice as long as broad, rarely three or four times as long; basal cell usually colorless, slightly broadening below into a colorless disk of attachment. In view of the large number of described species of *Chaetomorpha*, many known only from the descriptions, it may seem rash to add one more; but the plant now in question is much more slender than any other known attached erect species; an examination of a large suite of specimens shows that while a considerable range of size can be seen in the same tuft, in no case does the diameter exceed .04 mm., while the average is .03 mm., about half the size of the smallest heretofore known. Growing on sand, etc., in shallow tide pools near high water mark, La Jolla, San Diego County, California, May, 1898. *Mrs. E. Snyder.*

978. Cladophora flexuosa (Griff.) Harv. forma **Floridana**, n. f. More slender than the New England form represented by Farlow, Anderson & Eaton, No. 206, and with more virgate, less divided branches; somewhat resembling *C. Bertolonii* var. *hamosa* Ard. of the Mediterranean. On rocks, Key West, Florida, March, 1897. *Mrs. G. A. Hall.*[2]

[1] Subsequent study of this plant by Mr. Gardner indicates that its affinities may be with the *Cyanophyceae* rather than with the *Chlorophyceae.*

[2] I am indebted to Dr. E. Bornet for calling my attention to the resemblance between this plant and *C. polyacantha* Montagne, Ann. Sci. Nat., Series 3, Bot., Vol. XIV, p. 283, from Guiana, and for a fragment of an authentic specimen ; the numerous slender, pine-like, largely opposite ramuli are characteristic of both, and it now seems safe to efer the Florida plant to Montagne's species.

1193. Cladophora crispata (Roth) Kütz. forma **subsimplex**, n. f. A slender, sparingly branched form, possibly agreeing with some of the numerous forms and varieties described under this species, but in the absence of type specimens, this cannot be determined. The form name here given will serve until proper comparisons can be made, if ever. a. In dense masses, floating in a shallow spring, somewhat shaded by rocks, Berkeley, California, Feb. 22, 1903. b. Attached to stones and clay in a small waterfall, San Leandro, California, Nov. 3, 1902. *N. L. Gardner.*

1194. Cladophora fracta (Fl. Dan.) Kütz. forma **reflexa**, n. f. Main branches stout, flexuous; branches of higher orders patent or reflexed, often in secund series. Forming dense intricate masses in a water trough fed by a spring, North Berkeley, California, Sept. 1, 1902. *N. L. Gardner.* The remarks under 1193 will apply to this form also; the name is probably only provisional.

1079. Ectocarpus confervoides (Roth) Le Jolis forma **Halliae** (J. Ag.), n. comb. *Xanthosiphonia Halliae* J. G. Agardh, Analecta Algologica, Cont. I, p. 113, 1894. Branching like var. *typica* Kuckuck; sporangia up to .4 mm. long, .03–.04 wide, widest near base, tapering evenly to tip, which is often of only a single series of cells, but does not end in a hair. On shells, etc., St. Augustine, Florida, April, 1897. *Mrs. G. A. Hall.*

670. Ectocarpus confervoides (Roth) Le Jolis forma **irregularis**, n. f. Frond up to 15 cm. high, filaments slightly twisted below, free above; cells in main filaments .045 mm. diam., in branches about half this size; cells in main filament 1–3 diam., in lesser branches up to 8 diam., slightly constricted at nodes, branches rather erect. Plurilocular sporangia varying much in size and shape, .05–.15 mm. long by .02–.035 broad, large and small together; sometimes cylindrical, oftener largest at the base, diminishing in diameter near the middle; the tip not pointed; usually curved. In tide pool, Spectacle Island, Penobscot Bay, Maine, July, 1894. *F. S. Collins.*

738. **Strepsithalia investiens**, n. sp. Creeping filaments .005–.008 mm. diam., cells once or twice, occasionally up to four times as long as broad, swollen or cylindrical, irregularly branching, branches often arched and bearing on the outer side short, simple or branching filaments, about .006 mm. diam., cells one to two diameters. Unilocular sporangia ovoid, about .015 × .02 mm., sessile or on a short cell on main filaments and branches, empty sporangia persistent after emission of spores. Plurilocular sporangia cylindrical, .008–.01 × .025–.04 mm., mostly uniseriate, on same plants as the unilocular sporangia. Hairs few, of basal growth, about .008 mm. diam. Chromatophors small disks, several in a cell. This plant much resembles *S. curvata* Sauvageau, which occurs on the same host in Europe, but

is smaller in all its dimensions, both of filaments and sporangia, with fewer hairs, little investing gelatine, less regular erect filaments, and with plurilocular sporangia persistent for some time after emptying. Moreover it shows as a uniform coating on the host plant, rather than as Elachista-like tufts. In fronds of *Helminthocladia purpurea* (Harv.) J. Ag., San Pedro, California, July, 1899. *Mrs. H. D. Johnston.*

1038. Hecatonema maculans (Collins) Sauv. forma **solutum**, n. f. Basal layer an open network, otherwise like the type, which grows in the same locality on *Rhodymenia palmata* (L.) Grev. On *Castagnea virescens* (Carm.) Thuret and *Asperococcus echinatus* (Mert.) Grev., Spectacle Island, Penobscot Bay, Maine, July, 1898. *F. S. Collins.*

1084. Laminaria Agardhii Kjellm. forma **zostericola**, n. f. Very delicate form, growing on floating *Zostera marina* L., Newport Harbor, Rhode Island, April, 1899. *Mrs. W. C. Simmons.*

LXXXIII. Laminaria Agardhii Kjellm. forma **angustissima**, n. f. Fronds extremely narrow in proportion to the length; stipe 5 to 25 cm. long; lamina up to 3 meters long, 6 to 25 mm. wide. The substance is firmer than in other forms of the species, and there are no lines of bullae. The margin is even, not at all undulate, and the width is nearly the same in all but the base, and in young plants the tip. The dimensions given include the largest fruiting fronds observed; a width of more than 15 mm. is unusual; and fronds 12 mm. wide and 250 cm. long are common. Forming a very dense fringe just above and below low water mark, on rocks exposed to the full force of the waves, Bailey's Island, Casco Bay, Maine, July 18, 1903. *F. S. Collins.*[1]

834. **Dilophus flabellatus** n. sp. Frond reaching a length of 3 dm., dichotomous, in older plants sometimes with an apparent flexuous rachis and alternate branches, 3–5 mm. wide at base, broadening above to a width of 1–2 cm., all the divisions broadening upwards, terminal segments rounded; base stupose for a short distance. Young frond consisting of a single layer of large squarish cells, with a single layer of small cortical cells, the latter arranged in longitudinal series, and once to twice as long as broad; in older plants the margin is thickened and has two layers of internal cells, often with two layers of cortical cells; walls of internal cells punctate. Oogonia, antheridia and tetraspores on separate individuals, at first occupying the middle part of the segments, leaving the margin free; ultimately often covering the whole width; oogonia scattered more or less densely, but not usually in contact; antheridia in oval or oblong patches; tetraspores in similar patches, sometimes becoming confluent.

In young plants the branching is densely dichotomous with a rounded outline to the frond, but some of the segments develop more

[1] This is the *Laminaria* mentioned by the writer in Bull. Torrey Bot. Club, Vol. VII, p. 118, with the suggestion that it might be *L. longipes* Bory.

rapidly than others, so that as the plant grows older it assumes more of the character of a flexuous rachis with alternate branches. The width of the segments varies much, some dense-growing plants 15 cm. high having not over 3 mm., while other plants reach 2 cm., the widest part being in the best developed segments about three quarters of the distance from the base. In all cases the segments widen upwards, even to the terminal ones.

The older fronds with broad and somewhat sparingly divided segments resemble *Dictyota Binghamiana,* J. Ag. but the latter does not have the closely dichotomous branching and flabellate outline found in younger plants of *Dilophus flabellatus. Dictyota Binghamiana,* moreover, is described as having more or less frequent acute, incurved, marginal teeth, which are absent in the present species. *Dictyota liturata* J. Ag. and *Dictyota Pappeana* Kütz., as figured in Kutzing, Tab. Phyc., Vol. IX, Pl. 38, resemble in habit two extreme forms of this species, but both of them, as well as *Dictyota Binghamiana,* appear to be true *Dictyotas,* the internal layer never haying more than one series of cells. Young plants of *Dilophus flabellatus* have the same structure, but as the plant becomes older, the margin thickens, the large cells dividing by partitions parallel to the surface of the frond, for a greater or less distance from the margin, and at the same time the cortical layer often divides in the same manner. In the specimens examined this structure has seemed commonest in the antheridial plants, but this may be merely accidental.

It is by no means impossible that this species may have passed under the name of *Dictyota Binghamiana* or of *Dictyota Kunthii,* with which *Dictyota Binghamiana* was formerly identified. Older plants of *Dilophus flabellatus* resemble the other species very much in habit, and the *Dilophus* structure is to be seen only by careful sectioning. It is less developed than in other *Dilophus* species, and our plant is in some sense a link between the two genera. Its place would be in the section *Marginatae* with *Dilophus marginatus* J. Ag., which also has the greater part of the frond of a single series of interior cells, but whose frond, however, is not stupose, but is attached by a growth of rhizoids. On boulders near low water mark, La Jolla, California, October, 1899 and 1900. *Mrs. E. Snyder.*

1133. Fucus vesiculosus L. forma **limicola,** n. f. A very slender form, light yellowish brown when growing, seldom having vesicles, and seldom reaching a length of two decimeters. The com-

mon form of muddy shores in southern New England. Among *Spartina*, etc., on mud flats near high water mark, Mattapoisett, Massachusetts, Sept. 14, 1902. *F. S. Collins.*

833. Sargassum bacciferum (Turn.) J. Ag. forma **angustum**, n. f. Found in company with the form distributed as No. 832b, but quite distinct in habit, slenderer in all the parts. The two forms did not seem to be connected by any intermediate forms. In floating masses, lat. 25.58,[1] N., long. 73.39, W., June 1900, *Stmr. Admiral Sampson. Mrs. C. E. Pease & Miss E. Butler.*

1087. **Batrachospermum macrosporum** (Wood) Collins, n. comb. *Chantransia macrospora* Wood, F. W. Algae of the U. S., p. 216, Pl. XIX, fig. 3, 1872; Wolle, F. W. Algae of the U. S., p. 59, Pl. LXIX, figs. 1–12, 1887. The *Batrachospermum* form having been found, both in the Alabama material here distributed and in similar material from Florida, developing from a *Chantransia* form identical with the Nantucket material here distributed, the specific name given by Wood to the *Chantransia* has been used for the *Batrachospermum*, which appears to be a species hitherto undescribed. a. *Chantransia* form, Gibbs' Pond, Nantucket, Massachusetts, Aug. 3, 1895. *W. A. Setchell and W. J. V. Osterhout.* b. *Batrachospermum* form, on logs, sticks and stones in Fly Creek, a clear spring-fed creek that empties into Mobile Bay, Alabama. *De A. Saunders.*[2]

990. Batrachospermum vagum Ag. var. flagelliforme Sirdt. forma **tenuissima**, n. f. A slenderer form than that distributed under No. 188 of this work, but probably the same variety. Outlet of Ox Bow Lake, near Lake Piseco, Adirondack Mountains, Hamilton County, New York, Aug. 24, 1896. *Isaac Holden.*

836. Scinaia furcellata (Turn.) Bivona forma **complanata**, n. f. The frond is flattened throughout, even when quite fresh. The habit resembles that of uncalcified *Galaxaurata obtusata* (Ell. & Sol.) Lamour., but the structure agrees with the typical *S. furcellata*. Possibly the same as the plant described as *Isymenia angusta* J. G. Agardh,

[1] Erroneously printed lat. 55.58, N. in label.

[2] The name *Batrachospermum macrosporum* having been used by Montagne for a plant from Guiana, Ann. Sci. Nat., Series 3, Bot., Vol. XIV, p. 283, 1850, is no longer available for this plant, and **B. australe** is proposed in its place. The characters of the *Batrachospermum* stage may be briefly characterized as follows: color grayish green to gray violet; main branches virgate, with few long and many short branches, the latter at right angles, with acuminate tips; verticils pear-shaped to spherical, rather distant below, very close above; interverticilary filaments few; trichogyne stoutly clavate.

Analecta Algologica, Cont. V. p. 66, 1899. Washed ashore, Indian River Inlet, Florida, April, 1899. *Mrs. G. A. Hall.*

1138. Gelidium crinale (Turn.) J. Ag. forma **luxurians**, n. f. Fronds up to a decimeter long, simple below, but usually much branched pinnately above. Color of the growing plant a warm red brown, which is often retained in drying. On stones at low water mark, Pacific Beach, San Diego County, California, March 8, 1899. *Mrs. E. Snyder.*

1139. Gigartina canaliculata Harv. forma **laxa** n. f. Much less branched than the type, and lacking especially the short dense ramuli; quite distinct in extreme forms, but connected with the type by intermediate forms. Washed ashore, La Jolla, California. *Mrs. E. Snyder.*

1140. Cystoclonium purpurascens (Huds.) Kütz. forma **stellatum**, n. f. Branches beset with stellate tufts of short ramuli, lighter colored than the branches. Floating, South Harpswell, Maine, July 11, 1903.

938. Delesseria quercifolia Bory var. **linearis**, n. var. On stipes of *Lessonia* at extreme low water mark, Minnesota Seaside Station, Vancouver Island, July, 1901. *Miss E. Butler & Miss J. M. Polley.*[1]

636. Chondria tenuissima (Good. & Woodw.) Ag. forma **Californica**, n. f. Very iridescent when growing; the tips sometimes hooked, the same as in *Hypnea musciformis* (Wulf.) Lamour.; the ramuli more erect than in the usual form, the color darker. On various algae between tide marks, La Jolla, California, Oct. 15, 1898. *Mrs. E. Snyder.*

996. Chondria dasyphylla (Woodw.) J. Ag. forma **Floridana**, n. f. Main branches rather stout, flexuous, set sparingly with quite regularly alternate branches, ultimate ramuli long, cylindrical or slightly clavate, base hardly constricted, color pinkish or yellowish red. Washed ashore, Jupiter Inlet, Florida, Sept. 18, 1896. *Mrs. G. A. Hall.*

698. **Callithamnion Halliae**, n. sp. Frond up to 5 cm. high, usually with a percurrent axis, straight below, becoming flexuous near the top, up to .2 mm. in diameter at the base, not corticated, with similar alternate branches; these sometimes bearing a second series; the next series of branches dividing dichotomously, at first at wide angles; the subsequent forkings less and less patent, ultimate divisions

[1] No description was published with this label. It is distinguished from the type by the very narrow fronds, reminding one of forms of *D. alata* (Huds.) Lamour. In Setchell and Gardner, Algae of Northwestern America, Univ. of California Publications, Bot., Vol. I, p. 323, the genus *Delesseria*, in the older sense, is divided, and the plant now in question appears as *Schizoneura quercifolia* (Bory) J. Ag. forma **linearis** Collins, n. comb.

of one to several cells, from .01 to .02 mm. diam., not much tapering, end slightly rounded, without terminal hair. Cells throughout the frond usually about 4 times as long as broad, but where the forkings are very dense, 1 to 2 times as long. Cystocarps depressed spherical, not distinctly lobed, single or several together, situated in the forking of a lateral branch, or on the side of a main filament. Antheridia forming tufts on the upper side of the ultimate ramuli, occurring on the same individual as the cystocarps. Tetraspores tripartite, occasionally cruciate, pyriform, sessile on the upper side of the ultimate ramuli, often one on each joint. Color a pale to a deep rose.

This species presents quite a difference in habit, according as the alternate or the dichotomous system of branching is most developed, and as the latter is more or less dense. The two extreme forms resemble respectively *C. Baileyi* Harv. and *C. corymbosum* (Eng. Bot.) Ag.; its nearest affinity would seem to be with *C. corymbosum*. It adheres well to paper. Washed ashore, Key West, Florida. *Mrs. G. A. Hall.*

1148. Ptilota pectinata (Gunner) Kjellman forma **tenuis**, n. f. A comparison with the typical *P. pectinata*, distributed as No. 392, P. B.–A., shows this to be a much more delicate form, resembling rather *Plumaria elegans* (Bonnem.) Schmitz in habit. On rocks between tides, San Juan Island, Washington, June 25, 1899. *N. L. Gardner.*

847. Ceramium strictum (Kütz.) Harv. forma **proliferum**, n. f. Differs from the type by the more abundant lateral branches, by which it approaches *C. diaphanum*. It is perhaps the *C. diaphanum* of Harvey, Nereis Bor.-Am., part 2, p. 215, but not the *C. diaphanum* of Roth, which has not been found on this coast. On sand covered rocks, Bridgeport, Connecticut, July 12, 1891. *Isaac Holden.*

750. Halymenia Floridana J. Ag. forma **dentata** (Crouan), n. comb. *Gelinaria dentata* Crouan in Mazé et Schramm, Algues de Guadeloupe, 1870. Washed ashore, Indian River Inlet, Florida, May, 1899. *Mrs. G. A. Hall.*

650. Corallina gracilis Lamour. forma **densa**, n. f. The densely appressed branches give this form a quite different appearance from the typical C. gracilis, distributed as P. B.–A., No. 399; but there seem to be no distinctive characters sufficient to entitle it to rank as a species. a. On rocks exposed to the waves, Dillon's Beach, Marin County, California, Dec. 11, 1898. b. On exposed rocks, Pyramid Point, Monterey County, California, Jan. 8, 1899. *W. A. Setchell & R. E. Gibbs.*

The following species, discovered by the late Isaac Holden, was distributed under Nos. 1007 and 1163; the description, given with the latter number, is as follows:

1163. **Lyngbya (Leibleinia) subtilis** Holden n. sp.

" Filaments attached by the middle to other algae; free ends cylindrical or somewhat tapering; trichomes pale green, somewhat torulose, .003–.0045 mm. diam., articulations 1–3 to 1, usually 1–2 diam. long; terminal cell rounded, sheath thin, delicate.

Attached to various marine algae, Bridgeport, Connecticut; and along the coast to Maine. The filaments vary considerably in size; the general habit is not unlike some of the smaller species of *Plectonema*, but no branching has been observed."

MALDEN, MASSACHUSETTS.

A STATION FOR ASPLENIUM EBENOIDES IN MASSACHUSETTS.— On the 30th of September, 1905, I drove from Canaan, Connecticut, where I was stopping, to Ashley Falls in Massachusetts. The day was so hot that collecting seemed almost useless. On crossing the Massachusetts line I was relieved, however, to find shade, which at least looked cool. Crumbling abutments reached from the cliff towards the road. The hollows between were filled with greensward and the crevices in the rocks were full of all the lovely things that like limestone crannies. From one to another I hurried and peered like a mortal under a fairy spell. Walking-leaf, ebony and maidenhair spleenworts, bulblet bladder-fern, blunt-leaved Woodsia, mountain Geranium, harebells, and at the top rusty Woodsia were there and all most daintily set. In the rich soil between the back of the rocks and the river grew huge tufts of Christmas and evergreen wood-fern and on an occasional limestone outcrop small and very intensely colored purple cliff-brakes. I said to myself "Here we have the right soil and an abundance of *Asplenium ebeneum* with *Camptosorus rhizophyllus* elbowing each other; and whether *Asplenium ebenoides* is or is not a hybrid, I would like to hunt every inch of this place for a root of it, if I had the strength and two weeks time." Just then, up over my head on a ledge, a difference in the form of a fern attracted my attention, and after a scramble I actually had found the little plant in question. It was a small root, to be sure, but unmistakable in its identity and within the limits of Massachusetts, where so far

as I have learned *Asplenium ebenoides* has never been recorded before. Very near it was a vigorous plant of *Camptosorus rhizophyllus* on which nearly every frond was a departure from the typical leaf with rounded lobes. One had pinnae as distinct below as in *Asplenium ebenoides* itself, thus looking much as though this individual was a sort of missing link in the history of the interesting spleenwort.— Mrs. J. R. Sanford, Winsted, Connecticut.

The apetalous form of Arenaria groenlandica on Mt. Mansfield.— During the second week of June, 1902, I collected on Mt. Mansfield apetalous specimens of *Arenaria groenlandica* Spreng. The season was cold and wet and normal plants of the same species were developing slowly. On looking over the back numbers of my set of Rhodora I found a record relative to apetalous specimens of *A. groenlandica* collected by Mr. Rand in 1888 and others with reduced petals collected by Professor Fernald in 1894, and I intended to report immediately the new station which I had observed, but press of work prevented my doing so. In 1904 I searched again for the form in question but failed to find it. In 1905, however, on July 7th I was more fortunate, finding a colony some inches in diameter growing among the typical plants which were in full bloom. On both occasions the apetalous specimens were collected on the open ridge of the summit of the mountain. Only a few specimens were taken at either time and all were sent to the herbarium of the University of Vermont. The previous note on the apetalous form of this species records its occurrence in Maine only, and suggests that it may be a seasonal development. The finding of the form on Mt. Mansfield in early June not only extends the known range to Vermont but seems to indicate that it is not the result of any reduction or abortion of the normal form after normal flowering.—Elizabeth B. Davenport, Brattleboro, Vermont.

A New Variety of Carex interior.— During a recent excursion in the St. John Valley of the Josselyn Botanical Society of Maine I was much interested and perplexed by a strange Carex which abounded on a wet sandy shore below Fort Kent. The plant was obviously related to *Carex interior* but its slender lance-subulate mostly ascend-

ing perigynia gave it a distinctive appearance which would immediately attract a student familiar with the common *C. interior* of northern New England. Study of the plant shows it to be a very extreme variation of that common species, which, as it ordinarily occurs, has broadly deltoid-ovate wide-spreading perigynia. This peculiar variety in the St. John valley, collected on an excursion of the state botanical society, may appropriately bear the name of John Josselyn, the pioneer botanist of Maine. I therefore propose to call it

Carex interior Bailey, var. **Josselynii,** var. nov. Perigyniis lanceolato-subulatis 3 mm. longis 1 mm. latis ascendentibus. Maine, wet sandy shore of the St. John River, Fort Kent, July 6, 1904 (*M. L. Fernald*).— M. L. Fernald, Gray Herbarium.

Viola novae-angliae in the Penobscot Valley.— It is with great pleasure that I am able to record the finding of *Viola novae-angliae* House at Veazie in flower and fruit on June 10 and 23, 1905. Mr. F. M. Billings and I found it growing in crevices of the rocks along "The Cliffs" near the Penobscot River when it was just passing out of bloom at the first date given and later I collected it in fruit and cleistogamous flower. Specimens have been seen by President Ezra Brainerd who verifies my identification of the plant.— Ora W. Knight, Bangor, Maine.

The third annual meeting of the Botanical Symposium will be held from July 2 to 9, 1906, at Mountain Lodge, Little Moose Lake, Old Forge, N. Y. Through the courtesy of the members of the Adirondack League Club the privilege of occupying the Club House for one week is extended to the members of the Conference. Tickets should be bought to Fulton Chain Station on the Adirondack Division of N. Y. C. & H. R. R. Single fare from New York City $6.46. Board $2.00 to $3.00 a day. Stages will meet the party at Fulton Chain Station. Botanists intending to attend the Symposium are requested to notify Mr. Joseph Crawford, Secretary, 2824 Frankford Avenue, Philadelphia, Pa. A cordial invitation is extended to New England botanists to take part in this meeting.

The Josselyn Botanical Society of Maine will meet this year, July 3–6, at Rowe Ponds Camps, Pleasant Ridge Plantation. These camps are in the midst of the Somerset County forests, 10½ miles northwest of Bingham, which is the nearest village. Woods, ponds and streams are all around, and there is splendid opportunity for collecting and studying the characteristic plants of the region. It is expected that a speaker on forestry will give the principal address. Although this is a Maine society, it has numerous members in other States. Any botanist who wishes to explore this section of Maine during the first week in July, will be heartily welcomed by the Josselyn Society. A descriptive circular giving rates and further details will be sent, on application to the secretary, Mr. A. H. Norton, Portland Society of Natural History, Portland, Maine.

Vol. 8, no. 89, including pages 81 to 100, was issued 12 May, 1906.

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THE VIOLETS AND VIOLET HYBRIDS OF THE DISTRICT OF COLUMBIA AND VICINITY.

(Plates 71, 72.)

Homer Doliver House.

During the seasons of 1904 and 1905, a survey of the violets of this region was undertaken by the writer with the object in view of ascertaining the status of certain peculiar forms, some already described as species and others recognized as hybrids, and further to discover if possible whether or not the supposed hybrids were consistent with the pure species found in their immediate neighborhood.

A careful field study was made of a large number of colonies, and sets representing my collections have been placed in the herbaria of the National Museum, New York Botanical Garden, Missouri Botanical Garden, Harvard University, Ezra Brainerd and H. D. House.

Practically all of the characteristics peculiar to violet hybrids as noted by Mr. Brainerd in recent articles, apply to those found in this vicinity. Moreover, not a single hybrid was found but that the parent species were immediately associated with it or were to be found within a few rods. A brief review of the methods of cross-fertilization of the violets shows that for two species to be crossed they must not only occur in the same region but must be cohabitant with each other or at most, occur within a few rods of each other. Another noticeable fact is that the most remarkable hybrids and variations always occur upon new soil, recently cleared land, embankments, along ditches, etc. — in short, in places the conditions of which are due to the work of man and not nature.

It is not necessary for the purposes of this article to redescribe species already well characterized in recent manuals, and the pure species may be named as follows:

1. V. odorata L., escaped from cultivation.

2. V. blanda Willd. (*V. LeConteana* G. Don). According to Mr. Brainerd (Rhodora **7**: 248. 1905), the species heretofore called *V. LeConteana*, must now be referred to Willdenow's *V. blanda*.

3. V. lanceolata L.

4. V. primulifolia L.

5. V. pedata L.

6. V. pedata inornata Greene (*V. inornata* Greene, *V. pedata lineariloba* DC.?).

7. V. palmata L.

8. V. vespertilionis Greene.

9. V. ornithodes Greene. Occurs sparingly at Cleveland Park and along the Potomac River above The District line.

10. V. Stoneana House. First described and figured by Witmer Stone as *V. septemloba*, from plants collected in Southeastern Pennsylvania. Found in abundance by the writer at Hyattsville and Patuxent and at Rockville by Mr. Jos. H. Painter.

11. V. papilionacea Pursh.

12. V. filicetorum Greene.

13. V. sororia Willd. Occurs abundantly in rocky places along the Potomac River above Washington and sparingly in other localities.

14. V. affinis LeConte. (*V. obliqua* Hill?)

15. V. villosa Walt.

16. V. cucullata Ait. (Including *V. macrotis* Greene, and other segregates.)

17. V. Brittoniana Pollard. Related to *V. septemloba* LeConte, of the southern states and certainly distinct from it according to the unpublished plate of LeConte's and recent collections made in the south which agree with the original plate in having conspicuous runcinate lobes, an important character not found in *V. Brittoniana*.

18. V. pectinata Bicknell. Doubtfully distinct from *V. Brittoniana*, and apparently an entire-leafed form of it. One clump only was noted along with *V. Brittoniana* at Riverdale.

19. V. fimbriatula J. E. Sm.

20. V. sagittata Ait.

21. V. emarginata (Nutt.) LeConte.

22. V. SCABRIUSCULA Schwein. Along the River bottoms of the Potomac River above Washington.

23. V. PUBESCENS Ait. Great Falls, Md., Fairfax Co. and Bluemont, Va.

24. V. CONSPERSA Reichenb. (*V. Muhlenbergii* Torr., *V. labradorica* Authors, probably not of Schrank.) Rock Creek Park and toward Great Falls.

25. V. STRIATA Ait. Common along the River bottoms and Canal banks above the city of Washington.

26. V. RAFINESQUII Greene.

In addition to this list, the following forms have been described from this region, the exact status of which I have not had the opportunity to determine: *V. laetecaerulea* Greene, *V. filicetorum* var. *parthenica* Greene, *V. emarginata* var. *simulata* Greene, and *V. fontana* Greene.

The recognized hybrid forms are best given in alphabetical order as follows. All specimens cited by number or date unless otherwise stated were collected by the writer.

Viola affinis × papilionacea hyb. nov. At Woodridge, D. C., on a moist wooded hillside is a large colony of *V. affinis* (No. 651), and at the base of the hill in a meadow, *V. papilionacea* is abundant. When first seen (May 3d) there was noticed an abundance of what seemed to be a darker and broader-leafed form of *V. affinis*, growing lower down on the hillside than *V. affinis*. The intermediate characters of the leaves and flowers indicated its hybrid origin which specimens in fruit gathered later (June 15th) showed to be true. The abortive capsules were distinctly pubescent and the plant much larger than typical *V. affinis*.— Woodridge, D. C., May 3d, 1905 (No. 652) and June 15, 1905. Type in herb. H. D. House.

VIOLA AFFINIS × SAGITTATA Brainerd, RHODORA **8**: 55. 1906.— Patuxent, Md. June 4, 1905 (No. 972, type).

VIOLA AFFINIS × VILLOSA Brainerd, RHODORA **8**: 56. 1906.— Rock Creek Park, May 13, 1905 (Nos. 702, 705, 710); Glen Echo, May 17, 1905 (No. 733); Kensington, June 11, 1905 (No. 1003); Glen Carlyn, Va., June 25, 1905 (No. 1053, in part).

VIOLA BRITTONIANA × CUCULLATA House, Bull. Torrey Club **32**: 255, pl. 17. 1905. *V. notabilis* Bicknell, Torreya **4**: 131. *V. cucullata × septemloba* Brainerd, l. c. 52.— Riverdale, Md., June 8, 1905 (No. 988, in part).

Viola Brittoniana × emarginata nom. nov. *V. emarginata × septemloba* Brainerd, Rhodora **8**: 53. 1906.— One of the oddest of violet hybrids, growing in dense matted clumps and showing a great diversity in leaf outline. (Plate 71.) Hyattsville, May 7, 1905 (No. 683), June 4, and Sept. 25, 1905 (No. 937).

Viola Brittoniana × sagittata nom. nov. *V. sagittata × septemloba* Brainerd, l. c. 51, pl. 66, a & b.— Riverdale, May 1, 1905 (No. 639, type), and June 8, 1905 (No. 989).

Viola cucullata × emarginata Brainerd, Rhodora **8**: 53. 1906. Hyattsville, Sept. 25, 1905 (No. 1637).

Viola emarginata × fimbriatula Brainerd, Rhodora **8**: 57. 1906. Woodridge (Near District Line), June 15, 1905 (No. 649, in part).

Viola emarginata × papilionacea hyb. nov. Early leaves triangular, cucullate, cordate, glabrous, very small; flowers small, pale purplish-blue, about 1 cm. broad, with dark blue center and conspicuous purple veins; later leaves large, triangular, truncate or shallowly cordate, pale green, margins crenate-serrate toward the apex, deeply dentate or cut-toothed at the base, capsules about 6 mm. long or less on ascending peduncles, abortive, those from the petaliferous flowers apparently never developing.— Takoma Park, July 30, 1904 (No. 141), Aug. 25, 1904 (No. 334, type), Apr. 23, 1905 (No. 606), Oct. 4, 1905 (No. 1645).

Viola emarginata × sagittata Brainerd, Rhodora **8**: 58. 1906.— North Takoma (Nos. 140, 142, 905); Hyattsville (Nos. 1638, 1647); Glen Carlyn, Va. (No. 1047).

Viola emarginata × villosa hyb. nov. Leaves with the general outline of *V. emarginata* but smaller, shallowly lobed or toothed at the base, pubescent above with the conspicuous whitish hairs of *V. villosa.* Growing with both of these species at Takoma Park, May 2, 1905 (No. 646, type).

Viola fimbriatula × papilionacea Brainerd, Rhodora **8**: 54. 1906. *V. fimbriatula aberrans* Stone, Proc. Phila. Acad. **1903**: 683. pl. 37. f. 4–6. 1903.— Riverdale, Sept. 26, 1904 (No. 538), Sept. 25, 1905 (No. 1608); Darlecarlia Reservoir, June 17, 1905 (No. 1026, 1027).

Viola fimbriatula × sagittata Brainerd, Rhodora **8**: 57. 1906.— The most abundant violet hybrid of this vicinity and occurring almost everywhere that the two species, *V. fimbriatula* and *V.*

sagittata are found near together. Extremely diverse in leaf-outline and many of the intermediate forms are highly fertile, producing normal capsules and potent seeds.

Viola fimbriatula × **villosa** hyb. nov. Leaves oblong-ovate, strongly but rather distantly crenate, cordate, obtuse, sparingly pubescent on the petioles and under surface of the leaf-blades, strongly pubescent above with rigid, whitish hairs peculiar to *V. villosa*, deep-green but faintly mottled with whitish by the darker green regions of the principal veins, the abortive capsules on spreading peduncles.— Takoma Park, Aug. 3, 1904 (No. 143a, type).

VIOLA PALMATA × VILLOSA Brainerd, RHODORA **8**: 56. 1906.— Four-mile-run, Va., *Jos. H. Painter*, Aug. 5, 1904 (No. 865); *H. D. House*, Aug. 9, 1904 (No. 182); Darlecarlia Reservoir, May 23, 1905 (No. 804); Glen Echo, May 25, 1905 (No. 823); Rock Creek Park, May 13, 1905 (No. 712); Fairfax Co., Va., June 29, 1905 (No. 1079).

VIOLA PAPILIONACEA × SAGITTATA Brainerd, RHODORA **8**: 54. 1906.— This was referred to by me as *V. conjugens* Greene, in a previous article on the violets of New Jersey (Bull. Torrey Club **32**: 256. 1905), and a subsequent comparison of the New Jersey specimens with the type of *V. conjugens*, shows that they are the same. As *V. conjugens* was described from Anne Arundel Co., Md., it comes within the range of this paper.

Viola papilionacea × **villosa** hyb. nov. Mature leaf-blades oblong-ovate to suborbicular, obtuse, obscurely crenate toward the apex, more conspicuously serrate at the base, cordate, deep-green, nearly glabrous, especially beneath but the blades more or less pubescent above with whitish hairs, capsules abortive on spreading peduncles. Growing with the two species, *V. papilionacea* and *V. villosa* at Darlecarlia Reservoir, June 17, 1905 (No. 1029, type).

Viola Stoneana × **villosa** hyb. nov. Growing in dense, matted clumps, the leaves at flowering time spreading on petioles 5 to 10 cm. long, pubescent above with the silvery whitish hairs characteristic of *V. villosa* and even more strongly ciliate on the margins than *V. Stoneana*, nearly glabrous beneath and somewhat shining; size of plant and lobing of the mature leaf-blades exactly intermediate between the two species and growing with them. Flowers intermediate in color between the blue of *V. Stoneana* and the deep purple of *V. villosa*. (PLATE 72.)— Hyattsville, May 5, 1905 (No. 685, type), June 4, 1905 (No. 935a).

In addition to these forms which considerable field study of their habit and surroundings have shown to be unmistakably of hybrid origin and in which, for the most part, it has been easy to determine from what species they have been derived, there are many uncertain forms in need of further study. Among them may be noted what seems to be a triple hybrid between *Viola (fimbriatula × papilionacea)* and *Viola emarginata,* at Takoma Park, July 23, 1904 (No. 95).

Clemson College, South Carolina.

Explanation of Plates.

Plate 71. *Viola Brittoniana × emarginata* House. (Natural size.) *a.* Flowering plant. *b.* Mature leaf. *c.* Cleistogamous flowers. *d, e.* Capsules from cleistogamous flowers.

Plate 72. *Viola Stoneana × villosa* House. (Natural size.) *a.* Flowering plant. *b.* Mature plant. *c.* Cleistogamous flower. *d.* Capsule from cleistogamous flower.

NOTES ON ALGAE,— VII.

F. S. Collins.

In this number of the Notes are included records of various species, etc., new to our flora; also a few items of interest in regard to previously recorded species; unless otherwise indicated, all were collected by the writer.

Phormidium Retzii (Ag.) Gomont forma fasciculatum (Bréb.) Gomont, Monogr. des Oscill., p. 197. The typical *P. Retzii* is a widely distributed species, and is common in sluggish waters throughout New England, in the form of rather firm coatings, from one half to one cm. thick, on stones and other objects. When the current is rather brisk, these coatings sometimes fringe out into narrow strings, but the extreme form appears to be unusual. It was found by the writer in quite rapid water, in Lynnfield, Mass., June 11, 1905. There was a distinct stipe-like part, flattened, expanding above into a broader lamina, repeatedly dividing, and ending in innumerable long, slender,

pointed, free or entangled strings, waving actively in the current. The stipe was dark brown, the lamina and its divisions were intense blue-green; sometimes such a frond had a length of 60 cm., and a very curious resemblance in habit to one of the digitate Laminarias. It was distributed in Collins, Holden & Setchell, Phycotheca Boreali-Americana, No. 1254.

Lyngbya aestuarii (Mert.) Liebmann and L. semiplena (Ag.) J. Ag., are found as marine algae the world over, except in arctic and antarctic regions; the former has been found occasionally in fresh water in Europe, but apparently not in this country; both grew abundantly in an old claypit at West Cambridge, Mass., Aug. 6, 1905. *L. aestuarii* from this locality has been distributed as P. B.-A., No. 1255.

Calothrix stagnalis Gomont, Journal de Botanique, Vol. IX, p. 197. Forming stellate tufts on various filamentous algae in standing water, Medford, Mass., in August, 1903. It is one of the few distinctly epiphytic species of the genus; the filaments, seldom exceeding a millimeter in length, are 8–10 μ in diameter at the middle, tapering to a fine hair above, somewhat thickened at the decumbent base. The sheath is thin and transparent, the trichome aeruginous, distinctly torulose, with cells about as long as broad. There are two basal heterocysts, yellowish, spherical or subquadrate, and above them, in the mature plant, a sub-cylindrical spore, 12–14 μ diameter, 2–4 diameters long; rarely two spores occur. Spores have been reported as produced under culture in a marine species of Calothrix, but *C. stagnalis* was the first in which spores were found under normal conditions. Apparently the only record up to the finding of the American locality, as above, is that for the original station near Angers, France. Distributed as P. B.-A., No. 1114.

Endoderma viridis (Reinke) Lagerheim, Öfversigt Vet. Akad. Forhandl., p. 74, 1883. The only species of *Endoderma* hitherto known in America is *E. Wittrockii* (Wille) Lagerh., which is not uncommon in various brown algae on the New England coast. In September, 1883, the writer collected at Falmouth, Mass., a specimen of *Seirospora Griffithsiana* Harv., and on examining it under the microscope found in the older parts a green endophyte which he could not identify at the moment, and a memorandum was made to look it up when convenient. It was not until the present year that the matter was again taken up; and it was found that the plant agrees with description and figures of *E. viridis*. The filaments are more slender

than those of *E. Wittrockii*, averaging 6 μ diameter; the branching is more abundant and irregular; the cells vary from one to six diameters long, and are quite irregular in form, not nearly cylindrical, as in *E. Wittrockii.* A good figure will be found with the original description as *Entocladia viridis* Reinke, in Bot. Zeit., p. 476, Pl. VI, 1879. In Europe it has more southern range than *E. Wittrockii.*

Acrochaete repens Pringsheim, Abh. Königl. Akad. Wiss., Berlin, p. 4, Pl. II, 1862. In this paper on the morphology of marine algae, Pringsheim published two nearly related genera of green algae, *Acrochaete* and *Bolbocoleon*, both growing in the tissue of brown algae, at the island of Helgoland. In each there is a more or less branched filament, creeping among the cortical cells of the host, and bearing very long and slender bristles, which project beyond the surface of the host; but the character of the bristles is different in the two. In *Acrochaete* they arise each from the terminal cell of a short lateral branch; in *Bolbocoleon* the hair projects from a specialized nearly empty cell; this is partitioned off from the vegetative cells, and has a relatively large bulbous base to the long sheath. *Bolbocoleon piliferum*, the original and only species, has been found to have quite a wide distribution, but *Acrochaete repens* seemed to be limited to a small district in northern Europe. It was therefore interesting to find it occurring in considerable abundance at Wood's Hole, Mass., Sept. 1, 1905, in fronds of *Chorda Filum* (L.) Stack., the host plant of the original station. Distributed as P. B.-A., No. 1279.

Bryopsis hypnoides Lamouroux, Journal de Botanique, p. 135, 1809. While there have been occasional reports of the occurrence of this species on the New England coast, the writer has failed to obtain specimens confirming them, and it has seemed probable that all should be referred to *B. plumosa* (Huds.) Ag. A specimen from the herbarium of Capt. N. Pike, marked *B. hypnoides*, is evidently *B. plumosa.* Recently Mr. J. A. Cushman submitted to the writer a small collection of algae from Horseneck Beach, near New Bedford, and in this collection was a single specimen agreeing perfectly with European specimens of *B. hypnoides.* This was of course enough to give the species a place in our lists; and in May, 1905, it was found washed ashore at Mattapoisett, Mass., in sufficient quantity for it to be distributed as P. B.-A., No. 1286. Unfortunately some plants varied considerably from the type in the direction of *B. plumosa.* In *B. hypnoides* the branches of successive orders decrease gradually in size, those of each order being arranged spirally about their axis; in

B. plumosa the ramuli are bifarious and plumose, the distinction between branches of successive orders being quite marked. We certainly have both types; more investigation will be needed to make sure where specific lines should be drawn. Indeed, all the species of *Bryopsis* are vague in their limitations.

Streblonema parasiticum (Sauv.) De Toni, Syll. Alg., Vol. III, p. 575; *Ectocarpus parasiticus* Sauvageau, Journal de Botanique, Vol. VI, p. 82, Pl. III. A very small plant with irregular basal filaments penetrating the tissue of the host and sending out short, simple filaments with cells 6–8 μ diameter and about one and a half diameters long; also slender hairs and subcylindrical, mostly biseriate, plurilocular sporangia. In Europe this species occurs in *Cystoclonium purpurascens* (Huds.) Kütz., *Gracilaria compressa* (Ag.) Grev., and *Ceramium rubrum* (Huds.) Ag. It has been found here only in *Cystoclonium purpurascens*, in the main stems and larger branches of well grown plants; where the endophyte is abundant the natural red color is changed to a dull yellow. It has been collected at Harpswell, Maine, and at Wood's Hole, Mass.; probably it occurs wherever the host plant is found.

Streblonema oligosporum Strømfelt, Om Algvegetationen i Finlands sydvestra Skärgård, p. 133, Pl. I, fig. 5. Another minute endophytic plant, with a basal layer of somewhat contorted, freely branching filaments, composed of rather irregular cells usually 10 μ long, 5–10 μ diameter; from these arise simple, cylindrical branches, about 5 μ diameter, ending in colorless, articulate hairs, which project beyond the surface of the host; also uniseriate plurilocular sporangia, usually cylindrical, 25–40 by 8–15 μ, occasionally shorter and ovate-lanceolate in outline. This species was first found in Iceland, where it occurred in the tissue of *Coilonema Chordaria* Aresch.; a plant found at Bailey's island, Casco Bay, Maine, appears to be identical, although occurring in a different host, in this case, *Gloiosiphonia capillaris* (Huds.) Carm. While resembling the preceding species, it seems to be distinct; in *S. parasiticum* the basal filament bears, in addition to the hairs, short vegetative filaments and sporangia of about the same height; in *S. oligosporum* the hairs are borne at the ends of the branches, which are fewer in number and much longer than the sporangia.

Asperococcus echinatus (Mert.) Grev. var. vermicularis (Griff.) Harvey, Manual of the British Algae, p. 35. In place of the rather coarse, pipe-stem-like fronds of the type, the fronds in this

variety are hardly more than setaceous; up to 40 cm. long, with a diameter of about one millimeter; the sori show a tendency to an arrangement in rings about the frond. Found in a tide pool at Cedar Ledge, Casco Bay, Maine, July 15, 1904.

Malden, Massachusetts.

SOME NEW OR LITTLE KNOWN CYPERACEAE OF EASTERN NORTH AMERICA.

M. L. Fernald.

Recent studies in various genera of *Cyperaceae* in the eastern United States and adjacent Canada have made it necessary to recognize a number of undescribed species and varieties in our flora and to alter the current interpretation of some others. These items which have been accumulating for some years are here brought together as a series of notes arranged in the sequence of the genera and species as now understood by the writer.

Cyperus dentatus Torr. Fl. 61 (1824) was based upon *C. parviflorus* Muhl. Gram. 19 (1817), not Vahl. To the characterization of Muhlenberg's plant with the "Habitat ad ripas Susquehannae.... etiam in N. Anglia",[1] and with "Spiculis 3 compressis alternis ovatis, 8-floris,"[2] Torrey added "Spikes....appearing dentate or pectinate by the spreading of the points of the glumes when old";[3] thus indicating very clearly a plant which occurs on sandy shores from central Maine to western New York and southward at least to West Virginia. This characteristic plant with prominent scale-tips varies in the number of flowers from 5 to 13, and the spikelets are very often altered to leafy tufts. An extreme development of the plant which is more common in certain portions of southern New England than typical *C. dentatus* may be distinguished as

C. dentatus, var. **ctenostachys**, n. var. Spikelets 15–40-flowered, the scale-tips less prominent.— Massachusetts, West Pond, Plymouth, September 23, 1863 — type, September 13, 1853 (*Wm. Boott*); Middleborough Pond, September 9, 1870 (*Wm. Boott*); margin of

[1], [2], Muhl. Gram. 19 (1817). [3] Torr. Fl. 61 (1824).

pond, Centreville, August 5, 1901 (*Clara Imogene Cheney*): New Jersey, pine barrens, without definite locality (*Gray*, Gram. & Cyp. no. 71, in part); swamps near Atsion, September 26, 1867 (*C. F. Parker*).

Usually producing fewer bulblets than *C. dentatus*, and in its elongate spikelets and less prominent scale-tips appearing quite distinct. Numerous transitional specimens occur, however, and both extremes are sometimes mixed on the herbarium-sheets under one label; for example, Dr. Gray's New Jersey material in the Gray Herbarium and Mrs. Cheney's sheet of Centreville plants in the Herbarium of the New England Botanical Club.

Cyperus **hystricinus**, n. sp. Perennial by short branching rootstocks: the slender smooth rigid culms 2 to 5 dm. high, rising from hard corm-like bases, much exceeding the stiff narrow (2 to 5 mm. broad) smooth leaves: umbel of 3 to 10 smooth simple spreading-ascending rays, mostly shorter than the involucre: spikelets 1–2-flowered, subulate, rigid, 3 to 7 mm. long, densely crowded in cylindric or narrowly obovoid heads (1 to 2.5 cm. long), strongly reflexed, golden brown at maturity: scales closely appressed, the fertile strongly nerved, the terminal involute-subulate: achenes linear-cylindric, 2 to 2.5 mm. long.— New Jersey, sandy fields, near Haddonfield, October 13, 1867 — type (*C. F. Austin*): Pennsylvania, near Philadelphia, 1862 (*C. E. Smith*): Maryland, sandy fields, Salisbury, August, 1894 (*W. M. Canby*): Georgia, dry sandy soil south of Americus, July 20, 1901 (*R. M. Harper*, no. 1131).

Usually confused in the herbarium with *C. retrofractus* (L.) Torr., which has the culms scabrous at least above, the leaves short-pubescent, the few rays of the umbel mostly upright and longer than the involucre, and the spikelets in a conspicuously turbinate head. The differences between this plant and *C. retrofractus* were known to the late Charles E. Smith, whose specimens are accompanied by detailed notes indicating that the "rough" plant, *C. retrofractus*, is earlier mature than the smooth *C. hystricinus*.

Cyperus **dipsaciformis**, n. sp. Perennial from corm-like bases: culms scabrous at least above, 2.5 to 8 dm. high: leaves shorter than the culms, scabrous-hispid above, 4 to 9 mm. wide: umbel 4–12-rayed, some of the ascending rays often equalling the involucre: spikelets 1–3-flowered, subulate, rigid, 6 to 11 mm. long, crowded in cylindric or subcylindric heads (1.5 to 4 cm. long), strongly reflexed, yellow-brown at maturity: fertile scales with green midribs: achenes 3 mm. long.— Delaware, woods, New Castle County, and near Wilmington, 1864 (*W. M. Canby*): District of Columbia, along Rock Creek, Washington, 1868 (*F. Pech*); "in collibus siccis, apricis,

haud frequens", Washington, July, 1888 (*Th. Holm*); sandy thickets, near Washington, July 22, 1896 — type (*E. S. Steele*): Virginia, Bedford County, August 1, 1871 (*A. H. Curtiss*): Kentucky, Pine Mountain, Harlan County, August, 1893 (*T. H. Kearney, Jr.*, no. 222): North Carolina, sandy ground, Swain County, July 26, 1891 (*Beardslee & Kofoid*); sandy soil, Biltmore, June 22, 1897 (Biltmore Herb. no. 2134b): Georgia, Rome, July, 1888 (*Gerald McCarthy*); Stone Mountain, DeKalb County, July 3, 1893 (*J. K. Small*); dry woods, Athens, June 20, 1900 (*R. M. Harper*, no. 18).

Resembling *C. hystricinus*, but larger, with less developed rootstock, harsh leaves and culms, longer spikelets, scales with prominent green midribs, and longer achenes. From *C. retrofractus*, with which it has likewise been confused, clearly separated by its cylindric rather than turbinate-obovoid heads, browner spikelets, smooth rays, and much less developed rootstock. This is apparently the plant figured in Britton & Brown's Illustrated Flora (fig. 567) as *C. retrofractus*. The latter species which was *Scirpus retrofractus* L. Sp. 50 (1753) was based upon a figure of Plukenet's [1] which shows clearly a coarse plant with strongly turbinate heads, such as occur in a species which is well known from New Jersey to Florida and Texas, and northward in the low country to Missouri.

Cyperus filiculmis Vahl, Enum. ii. 328 (1805) from Carolina was described as having the spikelets 10-flowered, and the scales yellowish on the sides. These characters both of color and number of flowers are found in Carolina specimens and in general in plants of the southeastern states where *C. filiculmis* has the spikelets 1 to 1.6 cm. long, with 8 to 12 flowers, the scales rather thin and yellow-tinged. This plant is common in the southern states but apparently rare in the North where its limits seem to be Iowa, the Mohawk Valley, New York, and Middlesex County, Massachusetts. The common plant of the northern states and adjacent Canada differs in some rather important regards from the typical plant of the South and it is here proposed as

C. filiculmis, var. **macilentus**, n. var. Spikelets 3 to 8 mm. long, 4–8-flowered: scales firm, greenish: achenes slightly smaller than in the species.— Dry or sandy open soil, Maine to Ontario, south to Virginia, Ohio, and Illinois. A common plant of which the following, from among numerous specimens, are representative. Maine, Orono, July 26, 1895 (*M. L. Fernald*, no. 343) — type: New Hamp-

[1] Plukenet, Phyt. t. 415, fig. 4 (1742).

SHIRE, Hampton, September 22, 1901 (*B. L. Robinson*, no. 769): VERMONT, Johnson, August 10, 1893 (*A. J. Grout*): MASSACHUSETTS, Plymouth, September 6, 1873 (*Wm. Boott*): RHODE ISLAND, Cumberland, September 13, 1903 (*J. M. Greenman*, no. 1775): CONNECTICUT Southington, July 25 and September 24, 1895 (*C. H. Bissell*, no. 699): NEW YORK, western part of state (*Gray*, Gram. & Cyp., no. 74): VIRGINIA, Franklin, Southampton County, June 9–29, 1893 (*A. A. Heller*, no. 1031): ONTARIO, Point Colborne, July 19, 1901 (*J. Macoun*, no. 34,476): OHIO, vicinity of Wade Park, Cleveland, July 9, 1896 (*J. M. Greenman*, no. 143): MICHIGAN, Fort Gratiot, July 20, 1870 (*H. Gillman*, no. 36): WISCONSIN, Dells of the Wisconsin, August, 1858 (*I. A. Lapham*).

This northern plant with short spikelets and firm green scales seems in its extreme form very distinct from the typical *Cyperus filiculmis* of the South, but some specimens occur with few flowers but yellow-tinged thinnish scales, others with numerous flowers and firm scales.

ELEOCHARIS CAPITATA (L.) R. Br., var. **dispar** (E. J. Hill), n. comb. *E. dispar*, E. J. Hill, Bot. Gaz. vii. 3 (1882).

This local plant of Lake County, Indiana, has of late been treated as identical with the tropical and subtropical *E. capitata*, which occurs along the Gulf of Mexico and in Florida and extends northward along the coastal plain to Maryland. In its essential characters the material from northern Indiana cannot be separated from the southern plant; but *E. capitata* has whitish-brown scales and jet-black achenes, while *E. dispar* has the scales purple-brown and the achenes purple-black. These color characters hold in the twelve Indiana specimens before me and on this account the plant seems worthy recognition as an extreme extralimital variation from the tropical and subtropical type.

ELEOCHARIS **nitida**, n. sp. Perennial from a slender rootstock: culms capillary, 4-angled, striate, 2 to 8 cm. high: tips of the upper sheaths whitish: spikelet oblong-ovoid, acutish, 2.5 to 4.5 mm. long, 1.5 to 2.5 mm. thick, 8–20-flowered: scales elliptic-oblong, with rounded tips, purplish-brown, with greenish ribs and very narrow scarious margins, the lowermost 1 to 1.2 mm. long: achenes whitish-straw-color, narrowly obovoid, sharply trigonous, very minutely (under a lens) roughened, 0.7 to 1 mm. long; the very narrow crown-like tubercle with a short point in the middle.— QUEBEC, springy place, at border of swamp, Parker's Station, Pontiac County, June 3, 1903 (*J. Macoun*).

This beautiful little plant has been collected by Professor Macoun only at the original station on the Pontiac and Pacific Railway in the

Ottawa Valley, and he writes of it "What struck me particularly about it was its early maturity, and its short wiry stems which had a tendency to fall over. . . .The habitat I noted particularly as I was walking around collecting other species when I was struck with the maturity of this *Eleocharis* so early in the season, June 3rd." *E. nitida* is nearest related to *E. tenuis* (Willd.) Schultes, from dwarf specimens of which it differs in the whitish not dark-girdled tips of the upper sheaths, the narrow-margined smaller scales, the outer broad-margined scales of *E. tenuis* being 2 or 3 mm. long; the tiny sharp-angled whitish achenes with minute papillae, the larger achenes of *E. tenuis* being golden-yellow or orange-brown, becoming drab in age, obtuse-angled, and conspicuously papillose-roughened; and the very minute pointed tubercle.

Eleocharis intermedia (Muhl.) Schultes, var. **Habereri**, n. var. Bristles absent or rudimentary.— New York, sandy shores of Oneida Lake, Vienna, Oneida County, August 2 and 18, 1900 (*J. V. Haberer*, no. 1149a).

Of this plant Dr. Haberer wrote "All of this material has bristles fugaceous or *none*. Out of much material I find I have but 3 with bristles. . . .It is somewhat curious that the plants within the influence of water — subject to inundation — are liable to be *minus bristles*." This lack of bristles in certain species or varieties is frequent in *Eleocharis*, *Scirpus*, and *Rynchospora*, all or essentially all plants of a lake- or river-system being constant in this character. Thus the now well-known *E. diandra* Chas. Wright constantly lacks bristles throughout the length of the Connecticut Valley, about Oneida Lake and in the Androscoggin Valley. Nearly all the *E. Engelmanni* about Winter Pond in Winchester, Massachusetts, belongs to the bristleless var. *detonsa* Gray. *E. palustris*, var. *calva* (Torr.) Gray, so far as known to the writer, is a very local plant, though material is often collected at certain stations. All the *Scirpus debilis* about Lake Massapoag in Sharon, Massachusetts, is var. *Williamsii* Fernald, without bristles; and in a few regions — the Kennebec Valley, Maine, Lake County, Indiana, etc.— *Rynchospora capillacea* consistently lacks the perianth and is var. *leviseta* Hill.[1]

[1] For further comments on this point see Rhodora, iii. 250 (1901).

(*To be continued.*)

PRELIMINARY LISTS OF NEW ENGLAND PLANTS,— XIX.

J. Franklin Collins.

[The sign + indicates that an herbarium specimen has been seen; the sign — that a reliable printed record has been found.]

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
BUXBAUMIACEAE.						
Buxbaumia aphylla L. (1757)	+	+	+	+	+	+
" indusiata Brid. (1826)		+	+			
Diphyscium sessile (Schmid.) Lindb. (1863)	+	+	+	+	+	+
GEORGIACEAE.						
Georgia pellucida (L.) Rabenh. (1848)	+	+	+	+	+	+
" " var. curvata Lindb.	+			+	+	
" geniculata (Girgens.) Lindb. (1872)				+		
Tetrodontium Brownianum (Dicks.) Schwaeg. (1824)						
var. rigidum (Funck) Jur. (1882)	+	+				
POLYTRICHACEAE.						
Catharinaea angustata (Brid.) Brid. (1819)	+	+	+	+	+	+
" crispa James (1855)				+		
" undulata (L.) W. et M. (1803)	+	+	+	+	+	+
Pogonatum alpinum (L.) Röhl (1812)						
var. arcticum (Sw.) Brid. (1827)	+	+	+	+		
" brevicaule (Brid.) P. B. (1805)	+	+	+	+	+	+
" capillare (Mx.) Brid. (1827)	+	+	+	+		
" urnigerum (L.) P. B. (1805)	+	+	+	+		
Polytrichum commune L. (1753)	+	+	+	+	+	+
" " var. perigoniale (Mx.) Br. Eur. (1844)	+	+		+	+	+
" " var. uliginosum Hüben. (1833)	+	+			+	
" formosum Hedw. (1801)				+		
" gracile Dicks. (1798)		—	+	—		
" Jensenii Hagen (1898)	+					
" juniperinum Willd. (1787)	+	+	+	+	+	+
" ohioense R. et C. (1885)	+	+	+	+	+	+
" piliferum Schreb. (1771)	+	+	+	+	+	+
" Smithiae Grout (1903)			+			
" strictum Banks (1798)	+	+	+	+	+	+

Notes on the Preceding List.

Georgia pellucida var. *curvata* probably occurs throughout New England. It is here interpreted in its extreme form, with the strongly curved capsules. A close series of intergrades between this and the species is common; sometimes they all occur in the same colony. Its claims for varietal rank may be questioned.

Pogonatum aloides (Hedw.) P. B. (1805) was reported from western Massachusetts in 1833 by Prof. E. Hitchcock, and from Rhode Island in 1846 by S. T. Olney. No record of its occurrence in North America has been found since the latter date. It is not mentioned in Gray's Manual of 1848 (nor in subsequent moss manuals) although *P. brevicaule*, a common New England species which is not given in Hitchcock's list, is there described. It is quite apparent that the *P. aloides* of this list should be referred to *P. brevicaule*, as the latter was taken up in subsequent lists of western Massachusetts and the former dropped. This is certainly the case with the Rhode Island plant mentioned, for in 1847 Olney corrected his own error of the preceding year.

Pogonatum alpinum. Linnaeus, in his Species Plantarum, II, 1109 (1753), indicates the plant illustrated by Dillenius in his Historia Muscorum (tab. 55, fig. 4) as the one to which his name of *Polytrichum alpinum* applies. This plant, as there figured, is considerably branched and the capsules are elliptic in longitudinal section — at most only twice as long as wide. The same statement will hold true for this species as figured in the Bryologia Europaea (tab. 418), in Dixon's Handbook of British Mosses (Ed. 2, tab. 10. B.) and in other recent works, as well as for (presumably) authentic herbarium material of the European plant. In 1799 Swartz, in his Muscorum Frondosorum (pp. 76 and 105), described *Polytrichum arcticum* and figured the capsule (tab. 8, fig. 17). This is short cylindric and somewhat curved, being 2½–3 times as long as broad — not including the lid. He says (l. c. page 106) "*Obs.* Differt a *P. alpino* L. (cui simillimam): *Capsulis* omnino absque apophysi basilaris. *Capsulae* in P. *alpino* ovatae, magisque cernuae." Lesquereux and James (1884), Limpricht (1893), Roth (1904), and others, emphasize the short (ellipsoidal, ovate, or ovoid) capsule in *P. alpinum* and the longer or cylindric capsule in *P. arcticum* (*P. alpinum* var. *arcticum*).

I have seen no New England material with the elliptic or ovoid

capsules. All specimens examined have the cylindric capsules of varying lengths, while the gametophyte is usually much less branched than in European specimens of the species which have been examined, and often unbranched. It will be of interest to learn to what extent the species, as briefly characterized above, is known in New England and elsewhere in North America. At present it would seem that the variety is far more common than the species if indeed the latter occurs at all. Although the species has been reported from Maine, New Hampshire, Vermont, and Massachusetts it seems highly probable that these reports were based largely, if not wholly, upon specimens of the var. *arcticum* as here characterized. For this reason these reports are not recorded in the preceding list.

No species in the list has been more difficult to interpret than *Polytrichum commune* with its many forms and variations. The species, as described by Dillenius, Linnaeus, Bruch and Schimper, Dixon, Limpricht, Roth, Lesquereux and James, and others, appears to be much less common than has been generally supposed. It is impossible at the present time to place satisfactorily some of the forms of this species, yet certain conclusions have been reached which would seem to justify preliminary publication, especially as it is very desirable that the attention of collectors be called to the necessity of getting abundant material from various habitats and localities — more particularly perhaps from bogs, swamps, and other wet places. The writer would be very glad to get specimens from any and all parts of the country — especially from New England — with a view of attempting to clear up the uncertainty in regard to several varieties and forms, the identities of which are at present too problematical to appear in the above list. It is quite possible that the interpretation of *P. commune*, as outlined here, may have to be revised when more material is at hand. Briefly, *P. commune*, as here restricted, is the fairly tall plant of moist shaded places with the gametophyte normally at least 10 cm. high, stems mostly simple, leaves remote, the upper free part (blade) about 1 cm. long and appressed when dry but having the apex recurved and the shining leaf-bases conspicuous; seta 6–11 cm. and capsule 5 mm. (4–7) long; calyptra golden brown.

The var. *perigoniale* is a smaller plant (4–8 cm. high) of drier and more exposed situations, with leaves smaller and more crowded, so that, when dry and appressed, the leaf-bases are ordinarily not seen; seta and capsule shorter (the latter 3–4 mm. long). As a rule this

variety is darker colored in all its parts and more compact than is the species, suggesting a more xerophytic plant. The perichaetial leaves, although usually more conspicuous and more prominently hyaline, are not necessarily any larger than in the species. This variety undoubtedly occurs in Vermont though no record of its occurrence there has been found.

The var. *uliginosum* is just such a variation as might be expected in a very moist, well shaded, and humid situation; that is, with elongated and more or less flexuose stems, longer and more distant leaves. In the dried state a very pronounced character is the abruptly squarrose upper portion of the leaf, the apex of which is often somewhat recurved or even circinate. It should be expected in all the New England states.

From an examination of some thousands of leaf sections of *P. commune* and its allies during the past year it is quite evident that there is much more variation in the lamellae than might be expected from reading standard descriptions; for instance, the end cells in sections may vary from strongly crescentic to circular in the same leaf, depending respectively upon whether the section is cut near the middle of the leaf or down near the sheath. Likewise, the heights of the lamellae vary. Again, the lamellae of immature leaves differ from those of mature ones. The leaves and lamellae of new shoots differ from those of the old shoots when the amount of humidity or soil moisture is altered. This can easily be shown experimentally by transferring a plant from a moderately dry situation to a dish of water under a bell jar and later comparing the leaves of the new shoots with those of the old. The thickness of the outer wall of the end cell is also a variable quantity. In fact it is quite evident that certain external factors (climatic and edaphic as well as physiographic) play no small part in determining the form and structure of the lamellae, the leaves, and even the whole plant. The query suggests itself, "Are these factors alone wholly responsible for the existence of any of the varieties which have received distinctive names?" Here is a good field for experimentation.

Polytrichum formosum was reported from various New England states prior to 1885. Undoubtedly the bulk of the material so reported must be referred to *P. Ohioense* as has been repeatedly shown in various articles and catalogues since the date mentioned.

Polytrichum gracile was reported from Massachusetts and New

Hampshire in 1847 by William Oakes (Hovey's Magazine, **13**: 174). Dr. A. J. Grout writes me that the only specimens of this species which he has were collected in Vermont, so the New Hampshire locality mentioned in RHODORA (**1**: 53) is undoubtedly an error. The Vermont plants were collected on both Willoughby Mt., and on Mt. Mansfield by Dr. G. G. Kennedy.

Polytrichum Jensenii is a plant which is known from Lapland, Finland, Spitzbergen, Greenland, Alaska, and the Yellowstone Park. The Maine plant which is here referred to this species grew amongst sphagnum in a bog at Presque Isle. It differs mainly from authentic material, kindly loaned by Mr. J. M. Holzinger, in having longer and somewhat flexuose stems, less rigid leaves, and thinner-walled marginal cells of lamellae.

BROWN UNIVERSITY.

BOTANICAL EXHIBITION AT THE MEETING OF THE NATURAL HISTORY SOCIETIES OF NEW ENGLAND.— At the recent meeting to form a Federation of the Natural History Societies of New England, held at the rooms of the Boston Society of Natural History, there was an exhibition which visiting botanists found of some interest. The Appalachian Mountain Club showed a small collection of plants from above the tree line on Mt. Washington. These were mounted under sheets of transparent celluloid in such a way that they could be conveniently handled and examined without danger to the specimens, thus obviating a risk to which herbarium sheets, exposed to public view, are usually liable. Miss Cora Clarke of the Science Club showed a number of sheets of mosses, some of which were arranged as records of particular days of collecting. Professor R. H. Richards of the same club showed some strikingly instructive photographs of trees and shrubs, which exhibited successive stages in the development of flowers and leaves and fruit. In particular, two series, one of the Wych Elm and the other of the American Elm, each consisting of ten views of twigs taken at weekly intervals, were of special value as botanical studies. Harry A. Cash exhibited the Ricker mounts for plants. Miss Ella L. Horr, for the Worcester Natural History Society, had a collection of Ferns, Club Mosses, and Mosses, mostly from Worcester County. The Botany Class of the

Teacher's School of Science exhibited by request the collection of mosses, before exhibited, prepared by a committee of the class. The specimens were mounted in "simplex" celluloid mounts, on cards, in such a way as to admit handling and study with a hand lens without injury to the plants. The class also exhibited certain plants suitable for growth in school rooms, though seldom seen there, to call attention to their value as illustrations of adaptation to desert and other conditions, and of methods of vegetative propagation. The Barton Chapter of the Agassiz Association contributed about one hundred and twenty named fresh mosses as part of the collection of three members during the month of April, 1906. Most of these were collected in three localities near Boston and where moisture was necessary were bedded in *Sphagnum*.— M. Edna Cherrington.

Vol. 8, no. 90, including pages 101 to 116, was issued 28 June, 1906.

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JOURNAL OF

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THE GENUS SPHENOPHOLIS.

F. Lamson-Scribner.

The grasses which for nearly seventy years have been referred to the *Eatonia* of Rafinesque, constitute a small genus, but the characters which serve to distinguish it, the history of its development and relations with other genera, the remarkable inter-relation of its species and their geographical distribution are all points of more than usual interest. The species have been classified by botanists under seven genera and the seven species we here recognize have been cited under more than forty names. Michaux in 1803 placed his one species in *Aira*, and Sprengel, Muhlenburg, Elliott and some other authors of that period followed him. Desvaux (1808) referred the species to *Airopsis*, while De Candolle in 1813, and Torrey in 1824, referred them to *Koeleria*. Trinius placed them in *Trisetum* in the section *Colobanthus*, which Spach took up later (1846) as a genus, but too late for its adoption, the name having already been used by Bartling (1800). In the same year (1830) Kunth, recognizing the generic value of the characters present in the species, established upon Michaux's *Aira obtusata* the genus *Reboulea*, renaming Michaux's plant *Reboulea gracilis*. Gray took up *Reboulea* in the first edition of his Manual (1848), but in the meantime Endlicher (1837), who doubtless was aware that the name *Reboulea* had been applied to a genus of hepatics ten years prior to its adoption by Kunth, was induced for some reason, to refer the species to *Eatonia* of Rafinesque. This name was adopted by Gray in the second edition of his Manual (1856) and by all subsequent authors. After a careful reading of Rafinesque's diagnosis of

his genus *Eatonia* and the description of the species which he names as the type — *Eatonia purpurascens* — no one can believe that Rafinesque's *Eatonia* is identical with that of Endlicher. Rafinesque says of his genus that it is "intermediate between *Holcus*, *Aira* and *Panicum*.[1] He describes the spikelets as being polygamous, with one hermaphrodite and one male flower, the latter enclosed by the third glume, the first glume being "*plus petite*," characters which suggest *Panicum*. His type species is described as being 2 to 4 feet high with ciliate sheaths, divaricate, flexuose panicles, purple spikelets and its habitat the salt marshes of New York. There is no *Eatonia* as we have come to understand that genus, with divaricate purple panicles and none, so far as I am aware, which occur upon saline marshes about New York or elsewhere. We must regard the *Eatonia* of Endlicher, which he clearly describes, as an error in determination and as quite distinct from the *Eatonia* of Rafinesque published eighteen years earlier. This name as well as *Reboulea* and *Colobanthus* being thus unavailable our little genus whose species have been shut out from *Aira*, *Trisetum* and *Koeleria*, is without a name and is apparently homeless, for authors differ as to its position in the grass family, earlier botanists having associated it with the *Aveneae*, while those of more recent times have assigned it to the *Festuceae*, following the classification proposed by Kunth who allied his *Reboulea* with *Phippsia* and *Catabrosa*.

The following is a brief summary of the history or development of the genus: —

Michaux, in 1803, described one species under the name of *Aira obtusata*, giving as the habitat "in aridis Carolina ad Floridam." His description is very brief and admits of being either *Eatonia nitida*,

[1] **Eatonia** Rafin. Original description: "EATONIA. (Graminées.) Fleurs polygames mâles paniculées. Glume biflore, trivalve; valves inégales, mutique, sur un rang, l'extérieure embrassante, plus petite; l'intérieure plus grande. 2 fleurs entre l' intérieure et la médiane, une hermaphrodite et une mâle. Fleur hermaphrodite enveloppée par la grande valve; glumelle à 2 valves égales, plus courte que la glume. 3 étamines. 2 styles fimbriés. Fleur mâle embrassée par la glume médiane, glumelle a une seule valve embrassante. Beau genre intermédiare entre les genres *Holcus*, *Aira* et *Panicum*.

Type, *E. purpurascens*. Glabre, gaînes ciliées, ligules barbues, feuilles étroites, panicule divariquée, flexueuse; glumes ovées sans nervure, acuminées, l'exterieure carinée. Glumelles hermaphrodites, ellipitiques obtuses, lisses; glumelle mâle, ovale, aigue, bianguleuse. Belle plante de 2 à 4 pied de haut, dans les marais maritimes de New-York, etc. Fleurs pourprées. C'est l'*Holcus striatus* de quelques botanistes americains, mais nullement celui de Willdenow, etc. Est-ce aussi le *Koelera pensylvanica* Dec.? et l' *Airopsis obtusa* de Romer? Mais c'est certainement un genre distinct.

(Rafinesque in Journn. d. Phys. **89**: 104, 1819.)

filiformis or, as now understood, either the glabrous or pubescent form of *obtusata*. The latter (pubescent) form is by far the more common in the region specified.

Sprengel in 1807 published *Aira pallens* and *Aira nitida*. In 1810 he named the latter species *Aira pennsylvanica*. In 1813, Muhlenburg published *Aira truncata* based upon *Aira obtusata* of Michaux and in 1817 he published *Aira pallens*, apparently based upon the grass which has been more recently known as *Eatonia pennsylvanica* in which the second floret is awned and doubtless the same as *Aira pallens* Sprengel. Muhlenberg notes that awnless forms occur and evidently referred to these in his catalogue (1813) under the name of *Aira pallens mutica*. *Avena palustris* of Michaux, Muhlenburg treats as a distinct species.

Torrey (1824) describes two species and one variety under *Koeleria*:

1. *Koeleria pennsylvanica*, based upon De Candolle's *Koeleria pennsylvanica* with *Aira mollis* Muhl. and *Aira pennsylvanica* Spr. as synonyms. The grass described is *Eatonia nitida*.

2. *Koeleria truncata*, based upon *Aira truncata* Muhl. which is the *Aira obtusata* of Michaux. The grass described is the *Eatonia pennsylvanica* of A. Gray. The subspecies *major*, of Torrey, is certainly valid and includes *Eatonia intermedia* of Rydberg.

Elliott in his Sketch of the Flora of South Carolina and Georgia, 1816, describes two species, *Aira obtusata* Mx. and *Aira mollis* Muhl. Under the latter, he describes as a variety, *Eatonia filiformis* Vasey, but does not name it.

Trinius, in 1830, describes two species under *Trisetum* (Sect. *Colobanthus*), namely: *T. pennsylvanicum*, based upon *Aira pennsylvanica* Sprengel and *Trisetum lobatum*, which is *Eatonia obtusata* (Mx.).

Endlicher in 1837 takes up *Eatonia* of Rafinesque for *Reboulea* of Kunth (1830) and cites *Aira obtusata* Michx. as representing the genus.

Desvaux, Journ. Bot. 1808, refers *Aira obtusata* of Michaux to *Airopsis*.

Kunth in 1830 establishes *Reboulea* as a new genus to include *Aira obtusata* Mx. giving the latter a new name, *Reboulea gracilis*.

Gray in the first edition of his Manual (1848) takes up *Reboulea* of Kunth and describes two species with one variety; 1. *Reboulea pennsylvanica*, describing the grass now generally recognized as *Eatonia pennsylvanica*, but citing *Koeleria pennsylvanica* DC., which

is based upon *Aira pennsylvanica* of Sprengel, as a synonym, with the variety, *major* (*Koeleria truncata major* of Torrey). 2. *Reboulea obtusata,* based upon *Aira obtusata* Mx. In the second edition of the Manual, Gray refers these species to *Eatonia* following Endlicher who erroneously took up Rafinesque's name.

Chapman in 1860 describes two species with one variety — *Eatonia obtusata* (Mx.) and *Eatonia pennsylvanica,* citing *Aira mollis* Muhl. as a synonym which is the plant he describes, with the variety *filiformis.*

In 1886 Vasey raised Chapman's *E. pennsylvanica filiformis* to the rank of a species and published as new *Eatonia Dudleyi,* which is identical with *E. pennsylvanica* of Chapman and *Aira nitida* and *Aira pennsylvanica* of Sprengel, *Aira mollis* of Muhlenberg being the same.

Fournier in 1881 published one Mexican species which he named *Eatonia densiflora.* This is probably *Eatonia obtusata* with closely pubescent sheathes.

Beal, in 1896, describes six species as being North American raising *Eatonia pennsylvanica longiflora* Vasey to specific rank and making one new species, *Eatonia hybrida,* based upon what he supposed was Vasey's so-called hybrid between *Eatonia pennsylvanica* and *Trisetum palustre,* the *Eatonia pallens* of Scribner and Merrill. The grass he really described is an awned state of *Eatonia filiformis* (*E. aristata* Scribn. & Merrill.)

Scribner and Merrill (1900) published *Eatonia pallens* based upon *Aira pallens* of Sprengel and two species regarded as new, viz: *E. pubescens* and *E. aristata,* the first a pubescent subspecies of *Eatonia obtusata,* the second an awned state of *E. filiformis.*

Britton in his Manual of the Flora of N. Am. (1901) describes five species: *Eatonia obtusata* (Mx.) A. Gray, *E. pubescens* Scribn. & Merrill, *E. pennsylvanica* (DC.) A. Gray, *E. nitida* (Sprengel) Nash and *E. glabra* Nash.

Small, in his Flora of the Southern United States (1901) has seven species, those described by Britton and *E. filiformis* (Chapm.) Vasey, and *E. longiflora* (Vasey) Beal.

Recently (1905) Rydberg published *Eatonia robusta* (Vasey), based upon *E. obtusata robusta* Vasey, and *Eatonia intermedia* which is apparently the same as *Eatonia pennsylvanica major* (Torr.) Gray. *Eatonia robusta* has no valid characters to separate it from *Eatonia obtusata.*

Bentham in 1883 (Gen. Pl. **3**: 1184) recognized two species with possibly a third, while Hackel in Engl. & Prantl, Nat. Pflanzenfam. (1887) gives the number of species as two.

As already pointed out the genus has no available name and I venture to propose the name *Sphenopholis*, or *wedge-scale*, referring to the wedge-shaped second glume of some of the species when viewed from the side. I have reduced the thirteen species published under *Eatonia* to four with five subspecies.

Eatonia obtusata (Mx.) Gray " pubescens, S. & M. " robusta, Rydb. " densiflora Fourn.	= Sphenopholis *obtusata* (Mx.) subspecies *lobata* (Trin.), *pubescens* (Scribn. & Merr.)
" pennsylvanica A. Gray " pallens, S. & M. " longiflora Vasey. " intermedia Rydh.	= Sphenopholis *pallens* (Spreng.) subspecies *major* (Torr.), *longiflora* (Vasey.)
" nitida Nash. " glabra Nash. " Dudleyi,	= Sphenopholis *nitida* (Spr.) subspecies *glabra* (Nash.)
" filiformis Vasey, " hybrida Beal, " aristata S. & M.	= Sphenopholis *filiformis* (Chapm.)

Three species of *Trisetum* are transferred to the genus *Sphenopholis*, viz. *T. interruptum* Buckl. with subspecies *californica* (Vasey), *Trisetum Hallii* Scribn. and *Trisetum palustre* Trin. with new subspecies *flexuosa*, making in all seven species with seven subspecies.

I have referred to the close relationship of the genus *Eatonia* with *Trisetum* in more than one publication and a recent careful examination of the ample material in the National and Gray Herbaria has only served to convince me that Trinius was correct in referring the species to the *Aveneae*. With one exception none of the species is entirely awnless and the only constant character which serves to separate them from *Trisetum* is the articulation of the rachilla below the spikelet. This character is especially pronounced in *S. interruptum* and *S. Hallii*. I regard this character of good generic value; in this case at least it brings together a very natural group of species. All the species vary from wholly glabrous to more or less densely pubescent; there is a general resemblance throughout in the characters of the inflorescence especially in the details; in the dissimilarity of the outer glumes

and in the lemmas and paleas, the latter being always hyaline and strongly narrowed towards the base, and especially is there a common resemblance in the characters of the caryopsis. While the glumes and first floret are persistent, the second floret readily falls off at early maturity and so pronounced is this character that species have been described from herbarium material as having one-flowered spikelets. Kunth describes thus *Reboulea gracilis*.

The characters of the genus *Sphenopholis* as here constituted are the same as those assigned to *Eatonia* by Endlicher, Bentham and others excepting those of the lemmas or flowering glumes which are either awnless or awned below the entire or two-toothed apex, awn straight or divergent rarely twisted and geniculate. As here presented the genus stands, as follows:

Sphenopholis, new name.

Reboulea Kunth. Rev. Gram. **1**: 341, Pl. 84, 1830, not *Reboulea* Raddi 1820.

Colobanthus Trin (as a Sect. Trisetum.) 1830. Spach as a genus. Suites, Buff, **13**: 163, 1846, not Bartl. 1830.

Eatonia Rafin.; Endl. Gen. Pl. 99, 1837, not Rafinesque, 1819.

Gen. Char.: Spikelets small, 2–3-flowered, paniculate; rhachilla continued above the upper floret into a slender naked or pilose stipe, articulated between the florets and below the spikelets; flowers hermaphrodite. Glumes 2, dissimilar, persistent, membranaceous, the second becoming chartaceous or subcoriaceous in fruit, the first narrow 1- or rarely 3-nerved, the second much broader, usually broadly obovate, 3- or rarely 5-nerved; lemmas rather rigid, chartaceous, 3- rarely 5-nerved, nerves obscure, rounded on the back below compressed near the apex, obtuse, acuminate, entire or 2-toothed, awnless or awned just below the apex; awn straight or divergent, rarely twisted and geniculate; palea hyaline, shorter than the lemmas, narrowed towards the base, 2-nerved, usually somewhat 2-lobed and 2-toothed at the apex. Stamens 3. Styles very short; stigmas plumose. Caryopsis linear or oblong, more or less compressed, abruptly narrowed above into a short beak, glabrous, exsulcate, loosely enclosed within the rigid fruiting glume, free.

Slender grasses with usually flat leaves and narrow, often densely flowered panicles.

Allied to *Trisetum*.

Species 7. All North American. Type, *Sphenopholis obtusata* (*Aira obtusata* Michx.).

Key to the Species.

1 Spikelets awnless, rarely with the second floret short-awned, glumes very dissimilar 2

1 Spikelets always awned, glumes not very unlike 5

2 Leaves very narrow or involute-filiform, basal ones often equaling the culm, second glume broadly truncate . . . *S. filiformis.*

2 Leaves flat, much shorter than the culm 3

3 Panicle lanceolate or oblong, spikelets crowded, second glume as broad as long, somewhat cuculate in fruit . . . *S. obtusata.*

3 Panicle lax, branches more or less spreading, at least when in flower 4

4 Glumes nearly equal in length, the second very broadly obovate obtuse, florets obtuse, the second one very scabrous all over, *S. nitida.*

4 Glumes unequal, first shorter than second, florets mostly acute, glabrous . . . . *S. pallens.*

5 Panicle lax, spikelets not crowded, first floret usually awnless *S. palustris.*

5 Panicle narrow spiciform more or less interrupted below . 6

6 Glumes broadly oblanceolate, first floret with a short straight terminal awn . . . . *S. Hallii.*

6 Glumes narrowly oblanceolate, awns all alike . *S. interrupta.*

Subspecies.

S. obtusata lobata (*Trisetum lobatum* Trin.). Sheathes and leaves scabrous; panicle cylindrical, spikelets crowded on the short oppressed branches.

S. obtusata pubescens (*Eatonia pubescens* Scribn. & Merr.). Sheaths and leaves softly pubescent.

S. nitida glabra (*Eatonia glabra* Nash.). Sheathes and leaves glabrous or merely scabrous.

S. pallens major (*Koeleria truncata major* Torr.). Panicles narrowly lanceolate or oblong, rather densely flowered, first glume linear nearly equalling the second.

S. palustris flexuosa n. subsp. Panicle lax the flexuose branches spreading, both lemmas awned.

S. interrupta californica (*Trisetum californicum* Vasey). Plants pubescent throughout even to the glumes.

List of the Species with their Synonyms.

1. **Sphenopholis obtusata** (Mx.) Scribn. n. comb.
Aira obtusata Michx. 1803.
Airopsis obtusata Desv. 1808.
Aira truncata Muhl. 1817.
Koeleria truncata Torr. 1824 (Excl. descr.).
Koeleria paniculata Nutt. 1818.
Reboulea gracilis Kunth. 1840.
Reboulea obtusata Gray, 1848.
Eatonia obtusata Gray, 1856 (Excl. char.).
Southern New England to Florida and westward to Illinois and Texas.

1a. **Sphenopholis obtusata pubescens** (S. & M.) Scribn. n. comb.
Eatonia pubescens Scribn. & Merrill, 1900.
Distribution with the species.

1b. **Sphenopholis obtusata lobata** (Trin.) Scribn. n. comb.
Trisetum lobatum Trin. 1830.
Eatonia densiflora Fourn. 1881.
Eatonia obtusata Gray (excl. syn.).
Eatonia robusta (Vasey) Rydb.
Maine to Florida and westward to Washington, California. Mexico and Canada.

2. **Sphenopholis filiformis** (Chapm.) Scribn. n. comb.
Eatonia pennsylvanica filiformis Chapm. 1860.
Eatonia filiformis Vasey, 1886.
Eatonia hybrida Beal, 1896.
Eatonia aristata Scribn. & Merrill, 1900.
South Carolina to Florida and westward to Mississippi and Texas.

3. **Sphenopholis nitida** (Spr.) Scribn. n. comb.
Aira nitida Spr. 1807.
Aira pennsylvanica Spr. 1810.
Aira mollis Muhl. 1817.
Koeleria pennsylvanica DC. 1813.
Trisetum pennsylvanica Trin. 1830.
Eatonia pennsylvanica Gray, 1856. (Excl. descr.)
Eatonia pennsylvanica Chapman, 1860.
Eatonia Dudleyi Vasey, 1886.
Eatonia nitida Nash. 1895.

Southern New England, New York to North Dakota and southward to South Carolina, Florida, Mississippi and Texas. Canada.

3a. **Sphenopholis nitida glabra** (Nash.) Scribn. n. comb.
Eatonia glabra Nash. 1901.
Southern New York, Illinois, to South Carolina and Tennessee.

4. **Sphenopholis pallens** (Spr.) Scribn. n. comb.
Aira pallens Spr. 1807.
Aira pallescens Kitaib. ? 1817.
Koeleria truncata Torr. 1824. (excl. syn.)
Reboulea pennsylvanica A. Gray, 1848. (Excl. syn.)
Eatonia pennsylvanica A. Gray, 1856. (Excl. syn.)
Eatonia pallens Scribn. & Merrill, 1900.
Maine to North Carolina and westward to Wisconsin, Kansas and Texas.

4a. **Sphenopholis pallens longiflora** (Vasey) Scribn. n. comb.
Eatonia pennsylvanica longiflora. Vasey, 1894.
Eatonia longiflora, Vasey in Beal. 1896.
Texas and ? Louisiana.

4b. **Sphenopholis pallens major** (Torr.) Scribn. n. comb.
Koeleria truncata major Torr. 1824.
Reboulea pennsylvanica major Gray. 1848.
Reboulea gracilis Kunth. 1830. (?)
Eatonia intermedia Rydb. 1905.
Maine to Washington south to Pennsylvania, Illinois, Colorado, New Mexico and Arizona.

5. **Sphenopholis palustris** (Michx.) Scribn. n. comb.
Avena palustris Michx. 1803.
Aira pallens aristata Ell. 1816.
Trisetum palustre Trin. 1830.
Trisetum ludovicianum Vasey, 1885.
Massachusetts southward to Tennessee, Louisiana and Georgia. Canada to latitude 59°.

5a. **Sphenopholis palustris flexuosa** Scribn. n. subsp.
No. 274 A. Commons, from Delaware, 1874, and
No. 4800 A. A. Heller, from Penna. both in the National Herbarium.

6. **Sphenopholis interrupta** (Buckl.) Scribn. n. comb.
Trisetum interruptum Buckl. 1863.
Trisetum elongatum Beal, 1896, not Kunth. 1829. (Err. determ.)

Southwestern Colorado, Texas, Arizona and northern Lower California.

6a. **Sphenopholis interrupta californica** (Vasey) Scribn. n. comb.
Trisetum californicum Vasey, 1893.
Texas.

7. **Sphenopholis Hallii** Scribn. n. comb.
Trisetum Hallii Scribn. 1884.
Texas.

U. S. Department of Agriculture,
Bureau of Plant Industry, Washington, D. C.

SOME MAINE RUBI. THE BLACKBERRIES OF THE KENNEBUNKS AND WELLS.— I.

W. H. Blanchard.

In this and in papers to follow are given the results of a careful and persistent study of the blackberries of Kunnebunk, Kennebunkport and Wells, three adjoining sea-coast towns in Southwestern Maine, well-known summer resorts. The time given to this study was two weeks in August, 1904, and all the time from June 24 till Sept. 10, 1905, except one week in August spent in Connecticut. Kennebunk village was headquarters, and the steam and electric railroads made it comparatively easy to reach all parts of the section.

Much of the soil is sandy with outcropping rocks. Woods predominate made impenetrable by hospitable mosquitoes, while the highways are made dangerous by inhospitable automobilists. Many White Mountain and high northern plants such as *Aster radula*, Ait., are common, while no such plants as the Black Raspberry, Desmodiums or Lespedezas appear. A few miles north the normal flora of this latitude begins to be seen.

But five of the blackberries of Vermont and Connecticut were found: *Rubus Allegheniensis*, Porter (*R. nigrobaccus*, Bailey and *R. villosus*, of Gray's Manual) the common high blackberry of the north-east which is often very poor here; *R. recurvans*, Blanchard here perfectly at home; *R. procumbens*, Muhl. (*R. canadensis* of Gray's Manual); and innumerable forms of *R. hispidus*, L. and *R. setosus*, Bigelow (*R. nigricans*, Ryd.). The edible forms of blackberries except in

favorable situations do not furnish bountiful crops in this section and pickers are neither plenty nor enthusiastic, but the blueberry pickers are numerous and successful.

Of the nine species and varieties of plants considered in this paper, the first four are prostrate dewberries of the *Procumbens* class with edible fruit and canes of nearly the same size throughout. The last five belong to a class with stems thick at the base, tapering upward and outward, erect at first, recurving and tipping like a Black Raspberry. They have wide leaflets and the growth on old canes resembles that of the dewberries. They are called "mongrels," "half-high" and other expressive names.

* Stems prostrate. True Dewberries of the *Procumbens* class.

+– Prickles recurved, hooked.

RUBUS PROCUMBENS, Muhl. Plants completely prostrate, glandless, slightly pubescent, prickles strongly hooked; canes killing back most of their length in unprotected places; leaves of moderate size, 3-foliate; inflorescence with a few nearly erect slender pedicels; strongly tipping, *i. e.* rooting at the tip.

New canes. Stems prostrate, 4 to 8 ft. long, greenish, terete, glabrous and glandless, hard, often branched, and late in August branching at the ends, the latter swelling and tipping vigorously. Prickles short, strong, conspicuously hooked, quite numerous, 8 to 16 to the inch of stem, not noticeably in lines. Leaves of moderate size, rather thick, 4 to 5 in. long and wide, normally 3-foliate but often becoming 5-foliate, shining yellow-green on the upper surface, the few hairs often disappearing with age, bright green below and slightly pubescent, with hairs also on the large veins, ciliate on the edges. Leaflets rhomboidal or oval, entire in outline, abruptly narrowed to a taper point, rather coarsely and slightly doubly serrate-dentate or slightly serrate, the base entire; the middle one often nearly orbicular, 2 in. or more broad, the side ones wide, more or less lobed on the lower side, frequently divided, then cuneate at both ends and much narrower than the middle one; the basal leaflets quite narrow and cuneate. Petiole and petiolules rather slender, grooved, nearly or quite glabrous, prickles short and much hooked; the petiolule of the middle leaflet ½ in. long, the others sessile.

Old canes. Badly killed back except in protected places, prickles intact. Second year's growth consisting entirely of leafy, erect branches or stemlets, one from the axil of each old leaf, all bearing inflorescence. Branch stems 4 to 7 in. high, irregularly angled, considerably pubescent, often quite so, glandless, prickles slender, not numerous, slanting backward or hooked. Leaves 3-foliate or the upper ones unifoliate, bright green on the upper surface, paler below; in texture and pubes-

cence like those on the new canes. Leaflets oval, obovate or obwedge-shaped, sparsely serrate and cuneate at the base, rather coarsely serrate-dentate above and broadly pointed. Petiole and petiolules slightly grooved above, glandless, somewhat pubescent, prickles generally slender and hooked. Inflorescence with from 3 to 7, frequently 1, nearly erect, slender pedicels from ½ to 2½ in. long, more or less pubescent, glandless; or sometimes cymose or racemose. Pedicels subtended by leaves or leaflike bracts. Flowers, appearing the 20th of June, about 1 in. broad, petals wide, sepals very pubescent or woolly, mucronate. Fruit, ripe about the first of August, nearly globose, ½ in. in diameter; drupelets large, averaging nearly $\frac{3}{16}$ in. in diameter. Two fruits counted and measured: $\frac{7}{16}$ in. high, ½ in. wide with 15 drupelets each $\frac{3}{16}$ in. in diameter; ½ in. high, ½ in. broad with 19 drupelets each $\frac{2}{16}$ in. in diameter. Very edible.

A representative station: The territory in a radius of one-fourth of a mile around the railroad station at Wells Beach, Me. Frequent throughout Wells, Kennebunk and Kennebunkport. Found also in North Berwick, Biddeford and Saco. Dry open places.

This species is probably the one named *R. villosus* by Aiton in 1789 but the name had been used before. Gray, Wood and others called it *R. Canadensis*, L. The older authors called it *R. trivialis*, Michx. but Dr. Muhlenberg segregated it from that species in 1818. Bigelow gave a very good description of it growing on sandy ground but held to the name given it by Michaux using that of Muhlenberg as a synonym. That Muhlenberg named *this* plant need not be doubted though he did not describe it and left no specimens. The writer has recently (July, 1906) searched for several days in the southeastern part of Pennsylvania including Lancaster, Muhlenberg's old home and with the exception of a little *R. hispidus* no other dewberry could be found. The forms in Connecticut and those growing around Philadelphia, Lancaster, Baltimore and Washington are the same. It is common in Southern New England but in Maine, New Hampshire and Vermont it seems to be restricted to the White Oak sections or nearly so.

Rubus geophilus, n. sp. Plants perfectly prostrate, glandless, somewhat pubescent, prickles slender and hooked; canes very long and soft; leaves very large, 5-foliate, outline jagged, very coarsely serrate; stemlets very tall; inflorescence a few very erect, large and very long pedicels; fruit remarkably large; tipping readily.

New canes. Stems prostrate, 6 to 12 ft. long, greenish, glabrous and glandless, soft, tipping readily late in August from swelled ends. Prickles rather short, slender, hooked, not numerous, 5 to 10 to the inch of stem, not noticeably in lines. Leaves large, 6 in. long and wide,

rather thick, normally 5-foliate many 3-foliate, shining light yellow-green with appressed hairs on the upper surface, whitish with long appressed pubescence on the veins below, ciliate. Leaflets oval, outline broadly jagged, generally regularly so, short taper-pointed, very coarsely and doubly serrate and serrate-dentate, entire at the base; the middle leaflet very broad; the side leaflets one-half as wide as long, cuneate at both ends; the basal ones similar but much smaller. Petiole and petiolules stout, glandless, nearly glabrous, green, grooved; prickles few, stout, hooked; the petiolule of the middle leaflet $\frac{1}{2}$ in. long, the side ones very short, and the basal leaflets sessile.

Old canes. Considerably killed back, prickles somewhat broken. Second year's growth consisting of erect branches or stemlets 4 to 10 in. long, generally one from each old leaf axil, all bearing inflorescence. Axis somewhat zigzag, irregularly angled, green, glandless, slightly pubescent; prickles few, small, slender, generally hooked. Leaves large, 3-foliate, those of the inflorescence unifoliate; in color, texture and pubescence like those on the new canes. Leaflets and unifoliate leaves similar, oval, short-pointed at each end, coarsely and somewhat doubly serrate-dentate. Petiole and petiolules green, grooved, faintly pubescent; prickles few and small, hooked; the petiolule of the middle leaflet less than $\frac{1}{2}$ in. long, the side ones sessile. Inflorescence one to five green erect pedicels, 1 to 3 in. long, somewhat pubescent, glandless, subtended by leaves, the lower by the trifoliate, the others by the unifoliate ones. Flowers, appearing late in June, large, $1\frac{1}{4}$ in. broad; petals oval, one-half as wide as long; sepals pubescent or woolly, mucronate. Fruit short-oblong approaching globose, not regular, large and composed of the largest drupelets, sometimes $\frac{1}{4}$ in. in diameter. Four measured and counted: $\frac{11}{16}$ in. high by $\frac{9}{16}$ in. broad, 32 drupelets each $\frac{8}{16}$ in. in diameter; $\frac{3}{4}$ in. by $\frac{5}{8}$ in., 36 drupelets each $\frac{3.5}{16}$ in.; $\frac{3}{4}$ in. by $\frac{5}{8}$ in., 23 drupelets each $\frac{1}{4}$ in.; $\frac{9}{16}$ in. by $\frac{9}{16}$ in., 13 drupelets. Very edible. Fruiting season from August 1 to August 15.

Type stations: Near the railroad station Arundel in Kennebunkport, Me.; at the springhouse, Grove station in Kennebunk; near the railroad station at West Kennebunk; the ocean bank at Cape Arundel, Kennebunkport opposite the cottage of Mr. Ogden; and in a pasture near the station at Wells Beach. Open, dry ground. Frequent in Wells, Kennebunk and Kennebunkport.

This large dewberry may be worthy of cultivation, but the experience of the writer has been that no dewberry save in exceptional situations and in exceptional years produces much of a crop.

+ + Prickles straight.

Rubus plicatifolius, n. sp. Plants entirely prostrate, glandless, slightly pubescent, prickles slender and straight, never hooked; inflorescence a raceme with wide-spreading pedicels, remarkably fruitful, the fruit largely lying on the ground from its weight. Leaves large,

5-foliate, noticeably yellow, the leaflets with conspicuously plaited or ruffled margins. Tipping readily.

New canes. Stems prostrate, 4 to 6 feet long, greenish, terete, glabrous and glandless, often branched, the ends swelling late in August and readily tipping. Prickles long, slender, rather strong, straight with a backward slant, never hooked except near the tipping end, not numerous, 5 to 10 to the inch of stem, not noticeably in lines. Leaves rather large and thick, 5 to 6 in. long and wide; normally 5-foliate but often 3-foliate on early growth; noticeably yellow; light yellow-green and perfectly glabrous on the upper surface, lighter below and slightly pubescent, with hairs on the large veins; slightly ciliate. Leaflets oval, outline entire, taper-pointed; deeply, finely, sharply and somewhat doubly serrate-dentate, the base entire, the margin remarkably wavy-plaited or ruffled; the middle leaflet very broad, frequently nearly orbicular, often $2\frac{1}{2}$ in. wide; the side leaflets one-half as wide as long, cuneate at the base; and the basal ones smaller but having the same proportion. Petiole and petiolules rather slender, yellow, sparingly pubescent, grooved; prickles slender, strong, slightly hooked; the petiolule of the middle leaflet $\frac{3}{4}$ in. long, the side ones one-fourth as long and the basal leaflets sessile.

Old canes. But slightly killed back, prickles much broken. Growth of second year consisting of erect branches; occasionally a pure leaf branch, mostly fruit branches, 3 to 6 in. high, those near the base of the cane longer and more leafy than those nearer the extremity, generally one from each old leaf axil. Axis zigzag, irregularly angular, yellow, pubescent, glandless; prickles few, weak, straight and slender. Leaves very small, 3-foliate, those on the inflorescence unifoliate; in color and texture like those on the old canes, but more pubescent. Leaflets oval, pointed at both ends, deeply serrate-dentate with incurved teeth, the margins plaited or ruffled. Petiole and petiolules yellow, pubescent; prickles slender and few, nearly straight. Inflorescence a broad raceme, the axis 1 to $1\frac{1}{2}$ in. long with 6 or 8 pedicels set at a great angle to the axis, pubescent but glandless. Flowers rather large, $1\frac{1}{8}$ in. broad; petals oval one-half as wide as long; sepals very pubescent or woolly, mucronate; appearing about July 1. Fruit short-cylindric, not globose, about $\frac{5}{8}$ in. high and $\frac{1}{2}$ in. wide with large drupelets $2\frac{1}{2}$ to 3 sixteenths inches in diameter. Four measured and counted: $\frac{5}{8}$ in. high by $\frac{1}{2}$ in. wide 28 drupelets; $\frac{8.5}{16}$ in. by $\frac{8}{16}$ in., 27 drupelets; $\frac{7.5}{16}$ in. by $\frac{3}{8}$ in., 18 drupelets; $\frac{3}{8}$ in. by $\frac{3}{8}$ in., 20 drupelets. Very productive; picking season from August 1 to August 15.

Type stations: The railroad depot at Wells Beach and the highway thence to Kennebunk village, Maine. Very abundant in various places in Wells, Kennebunk and Kennebunkport. Also in North Berwick. Open places, especially in sandy ground.

The plaited or ruffled margins of the leaves of this plant make it unique among dewberries if not among blackberries in general. It

has, too, a regular raceme and is so loaded that the fruit lies on the ground.

Rubus arenicolus, n. sp. Plants perfectly prostrate, glandless but very pubescent, prickles long and straight, tipping readily. Inflorescence a corymbose cyme, flowers large and very conspicuous. Leaves small, 3-foliate, leaflets nearly orbicular. Prefers a sandy or gravelly home.

New canes. Stems very prostrate, brown, terete, 5 to 10 feet long, glabrous and glandless, the ends swelling and tipping in September. Prickles long, nearly $\frac{3}{16}$ in., straight with a slight backward slant or none, never hooked except near the tipping end, numerous, 10 to 20 to the inch of stem, not noticeably in lines. Leaves small and quite thick, $4\frac{1}{2}$ in. long by $3\frac{1}{2}$ in. broad, 3-foliate with an occasional leaf 5-foliate, light yellow-green with abundant appressed hairs on the upper surface, whiter beneath with copious pubescence and velvety to the touch, slightly ciliate. Leaflets nearly or quite orbicular, outline nearly entire, very short-pointed, finely and doubly serrate below, serrate-dentate above; the side ones more or less lobed on the lower side. Petiole and petiolules stout, reddish, glandless, very pubescent, deeply grooved; prickles long, slender, numerous, slightly hooked or straight; the petiolule of the middle leaflet $\frac{1}{2}$ in. long, the side ones sessile.

Old canes. Stems slightly killed back, prickles intact. Growth of second year consisting of erect, leafy fruit branches, 3 to 6 in. long, decreasing regularly in length from the base of the stem, one from each old leaf axil. Axis zigzag, irregularly angled, green, very pubescent, glandless, prickles slender, straight or slightly hooked. Leaves small, 3-foliate those of the inflorescence unifoliate, in color texture and pubescence like those on new canes. Leaflets broad-oval about 1 in. long and $\frac{3}{4}$ in. wide, broad-pointed at each end, generally sharply serrate or serrate-dentate; the unifoliate leaves often very wide, frequently nearly cordate. Petiole and petiolules green, very pubescent, prickles slender, hooked; the middle leaflet only stalked. Inflorescence an irregular cyme with 4 to 6 pedicels, very pubescent, glandless, with numerous long, slender, straight prickles, set perpendicularly to the pedicel. Flowers appearing the first week in July large and showy, $1\frac{1}{8}$ in. broad, petals broad oval or obovate, two-thirds as wide as long. Sepals white-woolly, mucronate. Fruit broad-oblong, about $\frac{1}{2}$ in. high and broad, drupelets large, $\frac{3}{16}$ to $\frac{1}{4}$ in. in diameter. Three measured and counted: $\frac{9}{16}$ in. high by $\frac{9}{16}$ in. broad, 19 drupelets; $\frac{1}{2}$ in. by $\frac{1}{2}$ in., 18 drupelets; $\frac{9}{16}$ in. by $\frac{5}{8}$ in., 22 drupelets. Very productive and edible. Fruiting season from August 10 to August 20. Open, sandy places.

Type stations: The railroad bank midway between Kennebunk depot and Parsons depot, Maine. Abundant around the Kennebunk town gravel-pit and in the highway below it, and at the

Kennebunk depot. Found also in numerous other places in Kennebunk and Wells.

This plant impressed the writer as very distinct in 1904 and was closely watched in 1905. Its abundant pubescence, large flowers, cymose inflorescence and late flowering considering its hot home distinguish it. Its tendency, too, to send up stocky flower stems from the root though not confined to this species is very noticeable.

* * Stems recurved. The end touching the ground or prostrate. The *Recurvans* class.

+ End often touching the ground, tipping in favorable places.

Rubus recurvans, Blanchard. Described in Rhodora, Vol. 6 (1904), page 223. Plants with stems erect in dry situations, in favorable places recurving and sometimes tipping; very pubescent but glandless; leaflets broad; new growth polymorphous — leafy branches, fruit branches and nearly leafless racemes, often more than one from the axil of the same old leaf. Inflorescence a quite regular raceme; fruit cylindric with numerous rather small drupelets. Four measured and counted: $\frac{1}{2}$ in. high by $\frac{3}{8}$ in. broad, 25 drupelets; $\frac{9}{16}$ in. by $\frac{7}{16}$ in., 31 drupelets; $\frac{9}{16}$ in. by $\frac{7}{16}$ in., 39 druplets; $\frac{5}{8}$ in. by $\frac{9}{16}$ in., 36 drupelets.

This species gives a good harvest of fine fruit and is abundant in many places in this section, notably on the west road from Kennebunk village to West Kennebunk midway between; at Wells Branch; around the sand-pit near Kennebunk cemetery; and between the railroad and Mousam river above Parsons station.

Var. **subrecurvans**, n. var. Plants dwarfish, pubescent; stems large and erect at the base, recurving, the end often touching the ground and tipping; prickles slender, strong and rather numerous. Leaves thin, very pubescent on the under surface, ternate in the early part of the season, the side leaflets deeply incised on the lower side, having a peculiar wavy appearance, leaflets very broad; these succeeded later by 5-foliate leaves. Inflorescence short-racemose with a few very short-stalked glands; flowers 1 in. broad, petals broad-oval; fruit subglobose, $\frac{1}{2}$ in. in diameter.

New canes. Stems erect, $1\frac{1}{2}$ to 2 feet high, soft, recurving, thick at the base, tapering gradually, the prostrate part maintaining one size, tipping in September, slightly angled, glabrous and glandless. Prickles slender, about $\frac{3}{16}$ in. long, 4 to 8 to the inch of stem, strong, straight, backward slant slight, set in lines on the angles of the stem or pith. Leaves thin, large, 3-foliate at first, these generally succeeded by 5-foliate smaller ones, glabrous and shining dark yellow-green on the upper surface, whiter and quite pubescent below, velvety to the touch, edges slightly ciliate or naked. Leaflets broad with long tapering points, outline entire or slightly incised, having a wavy

jagged look lost in the dried specimen, finely, sharply and doubly serrate becoming serrate-dentate toward the point, the middle leaflet rather broad-oval, nearly twice as long as wide, rounded at the base; the side leaflets on the trifoliate leaves also broad, oblique-angled at the base, more or less deeply and singly incised on the lower side, at length divided; on quinate leaves narrow-oval or rhomboidal, cuneate at the base; and the basal leaflets similar in shape but smaller. Petiole and petiolules slender, yellowish, slightly hairy, grooved; prickles rather numerous, slender, hooked; the petiolule of the middle leaflet $\frac{3}{4}$ in. long, the side ones short-stalked or sessile, the basal ones always sessile.

Old canes. Stems erect as before, soft prickles intact, light brown. New growth consisting of leafy fruit branches or occasionally a branch destitute of inflorescence, 3 to 7 in. long, one from each old leaf axil. Axis of branch yellowish, angled; prickles few, slender, hooked; pubescence considerable. Leaves rather large; in color, texture and pubescence similar to those on new canes; trifoliate, those of the inflorescence unifoliate. Leaflets long, rather narrow, oval, cuneate at each end, coarsely and somewhat doubly serrate, or approaching dentate toward the point; the unifoliate leaves similar in shape, or some wide and deeply incised, approaching trifoliate. Petiole and petiolules slender, grooved, yellowish, considerably pubescent; prickles slender, strong and hooked; the petiolule of the middle leaflet long, the others sessile. Inflorescence short-racemose; pedicels slender, pubescent with an occasional very short-stalked gland; subtended by small bracts and one or two unifoliate leaves, or on some by several small leaves. Flowers appearing about July 1 over an inch broad, petals broad-oval. Sepals rather long and slender, pubescent, with occasional, sometimes numerous, very short-stalked glands. Fruit subglobose, drupelets large, $\frac{3}{16}$ in. in diameter. Two measured and counted: $\frac{7.5}{16}$ in. high by $\frac{7}{16}$ in. broad, 16 drupelets; $\frac{5}{8}$ in. by $\frac{9}{16}$ in., 23 drupelets. Fruiting season from August 5 to August 20. Very edible.

Type station: In Kennebunkport, Maine, one-fourth mile north of the center of the village of Cape Porpoise on the Biddeford road. Abundant in the road and mowings east of it. Also two more stations in the town of Kennebunkport, one in Biddeford, and one in Old Orchard. Dry ground in open sun or light shade.

+ + End generally touching the ground or prostrate. commonly tipping.

Rubus recurvicaulis, n. sp. Plants glabrous $2\frac{1}{2}$ to 4 ft. high, stems very large at the base, recurving and the prostrate end tipping; prickles inconspicuous. Leaves large and thick generally blackening in drying, 5-foliate, leaflets broad. Inflorescence cymose-racemose, sepals occasionally glandular; flowers over 1 in. broad, petals broad oval; fruit subglobose $\frac{1}{2}$ in. in diameter.

New canes. Stems erect, rather soft, thick at the base, $2\frac{1}{2}$ to 4 feet high, recurving, the prostrate end swelling and tipping in September, more or less 5-angled or terete, brown, glabrous and glandless, sometimes branched. Prickles inconspicuous, slender, rather strong, straight, backward slant slight, not numerous, set in lines over the pentagonal pith. Leaves very large and thick on the erect part of the stem, often 8 in. long and 7 in. wide, smaller and thinner beyond, 5-foliate, very bright light yellow-green and glabrous on the upper surface, whiter and glabrous below, faintly ciliate; occasionally a few appressed hairs occurring on the upper surface and a few hairs on the veins beneath, slightly leathery to the touch. Leaflets oval or rhomboidal, taper-pointed, outline nearly or quite entire; finely, deeply, sharply and doubly serrate-dentate; the middle leaflet very broad, often on the large leaves nearly orbicular; the side leaflets also very wide on the leaves growing on the erect part of the stem, narrower on the recurving part and about one-half as wide as long, wedge-shaped at the base; and the basal leaflets similar in shape but smaller. Petiole and petiolules rather large, glabrous, grooved, yellowish; prickles medium size, hooked; the petiolule of the middle leaflet of large leaves 1 in. long; the side ones one-third as long, never sessile; the basal leaflets sessile.

Old canes. Stems erect as ever, prickles intact, well-tipped stems not killed back, easily cut. New growth consisting of leafy fruit branches solely, 4 to 8 in. long, no pure leaf branches on the lower part of the stem as in the erect species, usually one from each old leaf axil. Axis greenish, angled, prickles few and weak, glabrous or with faint pubescence, glandless, slightly zigzag. Leaves rather large, variable in shape, 3-foliate, those of the inflorescence largely unifoliate; thin, light yellow-green and glabrous. Leaflets normally broad-oval, pointed at each end, sharply, deeply and doubly serrate-dentate, often incised at the top; unifoliate leaves mostly broad also, incisely serrate-dentate; but narrow in some cases. Petiole and petiolules green, slender, nearly glabrous, grooved; prickles nearly wanting, the middle leaflet short-stalked, the side ones sessile. Occasionally more than one bud starting from an axil making a leafy mass with little inflorescence and narrow leaflets. Inflorescence cymose-racemose, axis short, pedicels 4 to 6, short, slender, glandless, nearly glabrous, subtended by small bracts. Flowers appearing about July 1 large, over 1 in. broad, petals broad-oval, showy. Sepals running to a slender point, nearly glabrous with occasional stalked glands on the outside, pubescent inside. Fruit very edible, subglobose, about $\frac{1}{2}$ in. high and wide; the drupelets large, from $\frac{3}{16}$ in. to $\frac{1}{4}$ in. in diameter. Seven measured and counted: $\frac{5}{8}$ in. high by $\frac{1}{2}$ in. broad, 25 drupelets; $\frac{9}{16}$ in. by $\frac{1}{2}$ in., 21 drupelets; $\frac{9}{16}$ in. by $\frac{9}{16}$ in., 19 drupelets; $\frac{7}{16}$ in. by $\frac{1}{2}$ in., 11 drupelets; $\frac{3}{8}$ in. by $\frac{1}{2}$ in., 9 drupelets; $\frac{9}{16}$ in. by $\frac{9}{16}$ in., 16 drupelets $\frac{1}{2}$ in. by $\frac{1}{2}$ in., 12 drupelets. Picking season August 10 to August 25.

Type station: The road from Grove depot to the village of Kenne-

bunk Beach, Maine. A very abundant plant in roads, mowings and pastures in Wells, Kennebunk and Kennebunkport. Also in Biddeford and Old Orchard. Open ground and light shade.

The writer first noticed this plant in 1904 and doubtfully referred it to *R. recurvans*, but its distinctness soon became evident with more observation. The lack of pubescence and comparative lack of prickles are alone sufficient to distinguish it from that plant, while its tendency to blacken in drying seems to be greater than that of any other blackberry.

Var. **inarmatus**, n. var. Plants large-stemmed, glabrous, glandless and nearly unarmed, $1\frac{1}{2}$ to 2 ft. high, recurving and the long slender end tipping. Leaves 5-foliate, thick, the earlier ones very large. Inflorescence an irregular cyme; flowers very large and showy, from $1\frac{3}{8}$ to $1\frac{5}{8}$ in. broad, petals wide; fruit globose, $\frac{1}{2}$ in. in dameter.

New canes. Stems erect, $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, thick at the base, brown, soft, recurving with a long, slender prostrate end, tipping in September, slightly angled, glabrous and glandless. Prickles very few and small, often none, straight, set on the angles of the stem or pith. Leaves thick, those appearing early very large, smaller beyond, yellow-green and glabrous on the upper surface, paler beneath and apparently glabrous, but with an appressed pubescence, not ciliate, 5-foliate. Leaflets broad, short taper-pointed, outline entire, finely and doubly serrate-dentate; the middle leaflet very broad, often nearly orbicular and approaching cordate; the side ones broad also, rhomboidal, broadly cuneate; the basal ones similar in shape but smaller. Petiole and petiolules large, glabrous, yellowish, prickles wanting; the petiolule of the middle leaflet about 1 in. long, the side ones one-fourth as long, and the basal leaflets sessile.

Old canes. Stems much nearer the ground, reddish brown, soft, prickles entirely wanting. New growth consisting entirely of leafy fruit branches 4 to 8 in. long, or rarely a branch without inflorescence, generally one from each old leaf axil, frequently several. Axis of branch green-yellow, angled, unarmed, finely pubescent, zigzag. Leaves of good size, coarse texture, 3-foliate; some on the inflorescence unifoliate; glabrous and yellow-green on the upper surface, light and faintly pubescent beneath. Leaflets narrow-oval, long; pointed at each end, rather coarsely and doubly serrate, nearly dentate toward the point; the unifoliate leaves mostly very broad and deeply 2-incised, approaching trifoliate. Petiole short, stout, grooved, unarmed, pubescent, the petiolule similar; the middle leaflet short-stalked, the side ones sessile. Inflorescence cymose approaching racemose, pedicels 4 to 6, rather long, slender, glandless, slightly pubescent, subtended by small bracts. Flowers very large, from $1\frac{3}{8}$ to $1\frac{5}{8}$ in. broad; the petals wide, measuring from $\frac{11}{16}$ in. long by $\frac{7}{16}$ in. wide to $\frac{13}{16}$ in. long by $\frac{8}{16}$ in. wide; sepals abruptly narrowed to a

point, hardly mucronate, very pubescent but glandless; opening about July 1. Fruit globose, ½ in. in diameter composed of large drupelets. Ripe early in August. Very edible but a poor cropper most of the fruit blighting and producing "dry fruit."

Type station: The railroad yard, ball-ground and waste dumps between the shoe-shops in the village of Kennebunk, Maine. Several large clumps in different parts of these grounds.

Rubus semierectus, n. sp. Plants erect at first, 1½ to 2½ ft. high; stems small at the base recurving and the long prostrate end tipping; often entirely prostrate the second year, sometimes nearly so the first; prickles rather numerous, straight. Leaves numerous, thin, somewhat pubescent, not large, very variable in size, 3-foliate or more often 5-foliate, leaflets often concave or convex drying with a wrinkled centre. Inflorescence corymbose, variable, often slightly glandular; flowers very small; fruit irregular in shape, not large, often abundant.

New canes. Stems erect or decumbent, recurving on vigorous, normal plants, the end of the cane often prostrate, greenish, terete, glabrous and glandless, sometimes branched, the ends normally swelling and tipping in September. Prickles short, slender, straight, strong, backward slant slight, never hooked, rather numerous, 10 to 15 to the inch of stem, not noticeably in lines. Leaves not large, very variable in size, thin, 3-foliate or more often 5-foliate, generally quite yellow, dull yellow-green with many appressed hairs on the upper surface, lighter beneath and considerably pubescent, very variable in amount, slightly ciliate. Leaflets broad-oval, often concave or convex, drying with a wrinkled center, outline nearly entire, short-pointed, finely and doubly serrate-dentate; the middle leaflet very broad, often orbicular; the side leaflets of trifoliate leaves also very broad and more or less singly cleft on the lower side; the side leaflets of quinate leaves broad oval, rhomboidal or obovate, broadly cuneate at the base; and the basal leaflets similar in shape but smaller. Petiole and petiolules yellowish, rather slender, glabrous and glandless, grooved; prickles rather numerous, slender and hooked; the petiolule of the middle leaflet about ¾ in. long, the side ones short-stalked, and the basal leaflets sessile.

Old canes. Often prostrate especially in fruit, prickles much broken. Growth of second year mostly fruit branches, occasionally a leaf branch, 5 to 10 in. long, commonly one from the axil of each old leaf. Axis of branch zigzag, irregularly angled, stout, yellow, pubescent, glandless; prickles few, slender, hooked. Leaves varying much in size and shape, 3-foliate, those of the inflorescence unifoliate, in color, texture and pubescence like those on new canes. Leaflets oval, often broad-oval, pointed at both ends, serrate-dentate. Petiole and petiolules slender, grooved, pubescent and glandless, the middle leaflet short-stalked, the others sessile. Inflorescence of two kinds; one a slender raceme with long, slender pedicels set at a sharp angle to the axis; the other a close raceme with a very short axis, the pedicels

short and stout set at a great angle to the axis. Pedicels 5 to 10, pubescent, often glandular. Flowers opening about June 20 noticeably small, $\frac{3}{4}$ to $\frac{7}{8}$ in. broad; petals oval, twice as long as wide; sepals woolly, sometimes glandular, mucronate. Fruit irregularly globose, composed of from 5 to 30 drupelets mostly large. Three measured and counted: $\frac{1}{2}$ in. high by $\frac{7}{16}$ in. wide, 27 drupelets; $\frac{9}{16}$ in. by $\frac{1}{2}$ in., 32 drupelets; $\frac{5}{8}$ in. by $\frac{1}{2}$ in., 32 drupelets. Ripening season from August 1 to August 15. Very edible, the crop often good but too much small fruit. Type in Kennebunk, Maine. Abundant in Kennebunk, Kennebunkport and Wells. Also seen in North Berwick, Biddeford and Saco. Dry places, open ground.

This is the most variable plant described in this paper. Its small flowers distinguish it from all the others. Perhaps it should not be put in either class. The cane is small at the base like a dewberry, but its tendency to keep off the ground is so great that it is brought down solely by the weight of the plant, only long canes ever becoming prostrate.

Supplementary Note.— The writer has recently found *R. geophilus* in New Bedford, Massachusetts, and *R. plicatifolius* in Burrillville and Gloucester, Rhode Island. An interesting form of *R. recurvans* with dark green leaves and other peculiarities occurs in Connecticut, Rhode Island and Southeastern Massachusetts.

Westminster, Vermont.

NOTES ON ALGAE,— VIII.

F. S. Collins.

Gobia Baltica (Gobi) Reinke, Algenflora der westlichen Ostsee, p. 65; *Cladosiphon Balticus* Gobi, Brauntange der Finnischen Meerbusens, p. 12, Pl. I, figs. 7–11. Nearly related to *Dictyosiphon*, but the cortical layer is more strongly developed, and takes the form of densely packed, few-celled filaments, at right angles to the axis of the frond; in this layer are imbedded the oval unilocular sporangia, sometimes slightly projecting; and through it issue the hairs. The branches are contracted at the base; the branching is never very abundant, and sometimes the fronds are nearly or quite simple. It

is found in all parts of the Baltic; the first American locality is Newport, R. I., where it was collected by Mrs. W. C. Simmons in June, 1899; since then a specimen has been received from Prof. John Macoun, collected at Louisburg, Nova Scotia. The Rhode Island plant is very little branched, and is of a softer texture than the Nova Scotia plant, or than authentic European specimens; otherwise they are much the same.

Myrionema Corunnae Sauvageau, Annales des Sciences Naturelles, Series 8, Bot., Vol. V, p. 237. In general appearance not unlike *M. vulgare* Thuret, this plant is distinguished by the usually very abundant plurilocular sporangia, cylindrical or slightly torulose, 5–7 μ diameter, 25–120 μ long, the cross walls often quite oblique, longitudinal divisions occasionally occurring. The sporangia are either sessile on the basal layer, or borne on a one- to four-celled pedicel. They are long and mostly pediceled at the center of the basal disk, becoming shorter and sessile near the margin; usually simple, they are occasionally branched; hairs are found occasionally, but not commonly; unilocular sporangia, so common in *M. vulgare*, are unknown in *M. Corunnae*. Sauvageau found no assimilative filaments, but Jónsson, Botanisk Tidsskrift, Vol. XXV, p. 144, mentions and figures them, in size and shape much like the sporangia, but with longer cells. He describes a variety *filamentosa*, in which the filaments of the basal portion are free, not united into a disk. In material collected in Casco Bay, Maine, all intermediate forms between the type and the variety were found. It occurs also at Wood's Hole, Mass., and at Newport, R. I., in each case on *Laminaria*, on which it is found also in Europe. Distributed as P. B.-A., No. 1234.

Lithoderma fatiscens Areschoug, Observationes Phycologicae, part III, p. 23. It is probable that two species, with quite different types of plurilocular sporangia, have been included under this name; the matter has been carefully gone over by Kuckuck, Wissentschaftliche Meeresuntersuchungen, Neue Folge, Vol. I, p. 237, 1894. The plurilocular fruit having never been recorded in America, while the unilocular fruit in the specimens to be noted here agrees with Kuckuck's description and figures, there is little risk in our identification. In habit and general structure it resembles *Ralfsia verrucosa* Aresch., but the cells contain each several small chromatophores, instead of the single large chromatophore of *Ralfsia*; the unilocular sporangia are terminal, each at the end of a vertical filament. While sterile

plants probably belonging here have occasionally been found, in only one instance has fruit been observed in American specimens and the determination made definite; in this case the plant grew on a pebble to which was attached a frond of *Laminaria longicruris* De la Pyl., washed ashore at Revere Beach, Mass., May 8, 1904.

Conchocelis rosea Batters, Phyc. Mem., Vol. I, p. 27, Pl. VII. Though less common than the other perforating algae, *Gomontia polyrhiza* (Lagerh.) Born. & Flah., and *Mastigocoleus testarum* Lagerheim, this species is not infrequently met with in dead shells of mollusks, mostly of the heavier kinds, to which it gives a pleasant pink color. By decalcification there is obtained a dense mat of articulate branching filaments, 2–7 μ diameter, cells varying greatly in length, occasionally expanding to 30 μ diameter, the expansion containing what is supposed to be a spore, 13–15 μ diameter. There has been some question as to the position of this genus, and it has been suggested that it may be a variety of *Ostreobium Quekettii* Born. & Flah., but this seems hardly likely, if Batters' description is correct. It has been found at Casco Bay, Maine, and at Revere Beach, Mass.; probably it will be found at other stations.

Rhodomela lycopodioides (L.) Agardh, Species Algarum, p. 377. This is a characteristic Arctic species extending some distance into the temperate zone on both sides of the Atlantic and Pacific oceans. It is extremely variable in form, and its distinction from the somewhat more southern and also variable *R. subfusca* (Woodw.) Ag. is by no means sharp. The writer found a small scrap of it washed ashore at Harpswell, Maine, in July, 1903; at a visit to the same place in June, 1904, it was quite abundant, but in July, 1904, and July, 1905, was again rare. This would seem to indicate that its season was earlier than that of *R. subfusca*, which is not uncommon, at least in its later stages, on the Maine coast in July. In typical *R. subfusca* the main branches are often nearly naked below, bearing spirally arranged branches of the next order, each order of branches being quite regularly arranged on the branch of the preceding order, the penultimate branches being short, of about the same length, and ending in a dense glomerule of ramuli. In typical *R. lycopodioides* the branching is more irregular and except at the tips more dense, the successive orders of branches less distinct, longer and shorter branches being intermingled; when the branching is dense it is dense throughout, not specially at the tips. Short spindle-shaped branches

are more or less abundant; in *R. subfusca* the ramuli are cylindrical or tapering. Numerous varieties of *R. lycopodioides* are described and figured by Kjellman, Algae of the Arctic Sea, p. 107; as all of these, and also the forms of *R. subfusca*, have marked seasonal variations, the result is often confusing. The Harpswell material varies considerably, mostly agreeing with forma *typica* subforma *tenera* Kjellman, some, however, is more like forma *tenuissima*. Distributed as P. B.-A., No. 1295.

Rhodochorton penicilliforme (Kjellm.) Rosenvinge, Annales des Sciences Naturelles, Series 6, Bot., Vol. XIX, p. 66. Like the nearly allied *R. membranaceum* Magnus, this species grows on *Bryozoa, Sertularia* etc., the two species often in company; they are, however, easily distinguished. In *R. membranaceum* the filaments grow freely inside the tubes of the host, sometimes so densely as to form an apparent membrane or cellular mass; rather short branches 6–8 μ thick break through the wall, and on these the terminal tetraspores are usually borne; in *R. penicilliforme* there is a disk of laterally united radiate filaments on the outer surface of the host; from this arise rather long erect filaments, about 12 μ diameter, bearing lateral tetraspores. It was found at Newport, R. I., in May, 1904, on a bryozoan attached to a *Laminaria*.

Rhododermis elegans Crouan in J. G. Agardh, Species Algarum, Vol. II, p. 505. The genus *Rhododermis* was founded on this species, the fronds occurring as small bright red spots on fragments of china and pottery in the harbor of Brest, France. The frond consists of a disk composed of one or two layers of laterally united, radiate filaments; on this disk are formed sori of cruciate tetraspores intermixed with clavate, more or less curved, paraphyses. *R. elegans* has been found at Harpswell, Maine, and at Revere Beach, Mass., in both cases on the shells and claws of live crabs. Distributed as P. B.-A., No. 1248.

Rhododermis parasitica Batters, Algae of Berwick-on-Tweed, p. 92, Pl. XI, fig. 2, A & B. In this species the frond is thicker than in *R. elegans*, appearing in cross section as if composed of densely packed, vertical filaments, with cells longer than broad; the color is darker, almost black. It occurs, both in Europe and with us on stipes of *Laminaria* species, and was found at Magnolia, Mass., by Prof. W. G. Farlow.

Rhododermis Georgii (Batters) Collins, in Phyc. Bor.-Am., No. 1299. *Rhodophyseuma Georgii* Batters, Journal of Botany, Vol. XXIX,

p. 377; *Rhododermis Van Heurckii* Heydrich, Beihefte zum Botanischer Centralblatt, Vol. XIV, p. 246, Pl. XVII. The fronds of this species are cushion-shaped, of dense cellular structure, growing chiefly at the edges of *Zostera* blades; they occur also on the surface of the blade, but do not develop as fully as at the edges, where their thickness is such that they sometimes show even to the naked eye as distinct prominences. *R. Georgii* was found abundantly at Wood's Hole, Mass., in April, 1905; has since been found at Harpswell, Maine, Revere Beach, Mass., and Rocky Point, R. I.; probably it occurs in spring all along the coast.

The three species of *Rhododermis* mentioned above are all that have been described in the genus; it is satisfactory to add them all to our flora at the same time.

MALDEN, MASSACHUSETTS.

SOME NEW OR LITTLE KNOWN CYPERACEAE OF EASTERN NORTH AMERICA.

M. L. FERNALD.

(*Continued from page 130.*)

SCIRPUS **hudsonianus** (Michx.), n. comb. *Eriophorum alpinum* L. Sp. 53 (1753), not *Scirpus alpinus* Schleicher in Gaud. Fl. Helv. i. 108 (1828). *Linagrostis alpina* Scop. Fl. Carn., ed. 2, i. 48 (1772). *Eriophorum hudsonianum* Michx. Fl. i. 34 (1803). *Trichophorum alpinum* Pers. Syn. i. 70 (1805). *Scirpus Trichophorum* Asch. & Graebn. Syn. ii. ab. 2, 301 (1903).

I have recently discussed this plant at length [1] and the reasons why it should be considered a *Scirpus* rather than an *Eriophorum*. The ruling of the International Congress at Vienna requires the retention of the earliest available specific name, and since there is already a *Scirpus alpinus* of Schleicher, it is necessary to take up Michaux's name which was given to a plant clearly identical with the Linnean *Eriophorum alpinum*.

[1] RHODORA, vii. 131, 132 (1905).

Scirpus **etuberculatus** (Steud.), n. comb. *S. maritimus*, var. *cylindricus* Torr. Ann. Lyc. Nat. Hist. N. Y. iii. 325 (1836). *Rhynchospora etuberculata* Steud. Syn. Pl. Cyp. 142 (1855). *Scirpus leptolepis* Chapm. Fl. 520 (1860). *S. Canbyi* Gray in Canby, Proc. Acad. Nat. Sci. Philad. 1864, 18. *S. cylindricus* Britton, Trans. N. Y. Acad. Sci. xi. 79 (1892).

Scirpus robustus Pursh, Fl. 56 (1814) as now understood by the writer is a tall plant of the shores of the Gulf of Mexico and Florida, extending north to Cape Cod. Its green leaves are very long, equalling or overtopping the stout tall (0.7 to 1.2 m. high) culm; those of the involucre 3 or 4, the longest 2.5 to 4 dm. long: its spikelets are very rufescent, ovoid to cylindric, some sessile, others on short rays: the scales are all pubescent and strongly colored with elongate red markings and the awns many times exceed the cleft tips.

Northward and in alkaline regions of the interior *S. robustus* gives way to a variable plant with shorter paler leaves, and the scales of the spikelets from whitish-brown to castaneous scarcely if at all rufescent, the outermost scales glabrous except at tip, and the awn only twice or thrice exceeding the cleft-tip. This plant of the northern and interior portions of the continent, as stated, is very variable, but a prolonged study supplementary to a former attempt to separate the plants clearly [1] has failed to reveal any constant characters by which the plants can be separated specifically. This series of variations as understood by the writer falls into the following arrangement.

S. campestris Britton. Culms 0.3 to 1 m. high, usually exceeding the stiff pale leaves (3 to 9 mm. broad): involucral leaves 2 (or 3), the longer 1 to 2 dm. long: spikelets whitish brown, ovoid to cylindric, 1 to 2 cm. long, 6 to 10 mm. thick, 2 to 11 in a dense glomerule occasionally a few in a secondary glomerule: scales puberulent, or the outermost glabrous except at tip; the slightly curved awn twice or thrice exceeding the cleft-tip: achenes lenticular, plano-convex or obscurely trigonous.— Britton in Britton & Brown, Ill. Fl. i. 267, fig. 627 (1896); Bicknell, Torreya, i. 95 (1901). *S. robustus*, var. *campestris* Fernald, Rhodora, ii. 241 (1900).— Manitoba to Kansas, Nevada, eastern California and northern Mexico. Northward and in the mountains passing to

Var. **paludosus** (A. Nelson), n. comb. Similar but with the scales drab to castaneous. *S. paludosus* A. Nelson, Bull. Torr. Bot. Club, xxvi. 5 (1899); Bicknell, l. c. 94 (1901). *S. robustus*, var. *paludosus* Fernald, l. c. (1900). Alkaline soil, from the Gulf of St. Lawrence

[1] Rhodora, ii. 238 (1900)

to the Pacific, south to New Jersey, central New York, Kansas, Wyoming, &c.

Var. **novae-angliae** (Britton), n. comb. Usually taller (1 to 2 m. high): the involucral leaves 3 to 5, the longest 2 to 3.5 dm. long: the looser inflorescence with 3 to 9 curved rays (2 to 10 cm. long): spikelets long-cylindric, 2 to 5 cm. long.— *S. novae-angliae* Britton in Britton & Brown, Ill. Fl. iii. 509, fig. 627a (1898).— Maine to southern New York, also western New York.

Var. **Fernaldi** (Bicknell) Bartlett in herb. Spikelets short-ovoid, 1 to 2 cm. long, on mostly elongate rays.— *S. Fernaldi* Bicknell, l. c. 96 (1901).— Maine to Massachusetts.

Scirpus atrovirens as it usually passes in eastern America is a complex of three well marked species, which have been already defined, two as a species, one as a variety. A very full suite of specimens and field notes sent to the writer by Dr. J. V. Haberer has enabled him to study the plants with much satisfaction and the results of this study may be briefly summarized as follows.

S. atrovirens Muhl. Gram. 43 (1817). Rather stout, 0.8 to 1.5 m. high: leaves pale green, with scabrous margins, 7 to 15 mm. wide, at least the lower nodulose-reticulate, the ribs 0.25 to 0.3 mm. apart: some of the rays of the inflorescence elongate and definite: spikelets dull greenish-brown or rufescent, narrowly ovoid to cylindric, 3.5 to 8 (rarely 10) mm. long, in glomerules of 10 to 30: scales dark brown, orbicular-ovate, abruptly mucronate, 1.5 to 2 mm. long, one-third longer than the achene: bristles sparsely and strongly barbed, nearly straight, as long as the conspicuously pointed and obovoid-oblong trigonous achene.— Meadows and bogs, Montmorency County, Quebec to Saskatchewan, south to Georgia and Missouri. Fruiting in the North in late July and August. Local in New England and adjacent Canada.

Var. **pycnocephalus**, n. var. All the rays abbreviated; glomerules crowded in a dense irregular head.— New York, rich alluvial soil, border of Little Lake, Mohawk flats, 2 miles east of Utica, July 18, 1900 (*J. V. Haberer*, no. 1516a).

S. **pallidus** (Britton), n. comb. Similar: leaves very pale: spikelets pale brown, very numerous in irregular glomerules: scales elliptic-ovate, 2 to 3 mm. long with the conspicuous pale midribs prolonged into long setulose awns, about twice as long as the achenes.— *S. atrovirens,* var. *pallidus* Britton, Trans. N. Y. Acad. Sci. ix. 14 (1889). — Manitoba to Kansas and the Rocky Mountains.

S. georgianus Harper. Slender, 3 to 12 dm. high, bright green: leaves smooth, rarely nodulose below, numerous, crowded at base, 0.5 to 1 cm. broad, the ribs 0.15 to 0.2 mm. apart: spikelets 2 to 4 mm. long, numerous in the glomerules: the greenish-brown or rufescent

scales mucronate, 1 to 1.5 mm. long, slightly exceeding the elliptic-oblong achenes: bristles shorter than the achene, very finely setulose, or wanting.— Bull. Torr. Bot. Club, xxvii. 331, t. 22 (1900).— Quebec to Michigan, south to Georgia and Arkansas. Fruiting northward in late June and July. The common plant of New England.

Scirpus cyperinus (L.) Kunth has been discussed by me in detail[1] and a number of allied species and varieties set off from it. The true *S. cyperinus* with the spikelets all glomerulate has reddish brown involucels, scales and bristles, and occurs from New England to Virginia, Tennessee, and Arkansas, being commonest in the middle Atlantic States. The common representative of *S. cyperinus* in Newfoundland, eastern Canada and northern New England, differs so generally in the color of its involucels and bristles that it is here designated

S. cyperinus, var. **pelius**, n. var. Involucels dull brown or drab, with blackish bases: rays elongate the glomerules mostly distinct: bristles drab or smoke-color.— The common extreme northward, occurring generally from Newfoundland to Ontario, south to Connecticut, central New York, and Michigan. The following, from among nearly 100 sheets examined, are characteristic specimens. Newfoundland, damp places in woods, Torbay, August 21–26, 1901 (*Howe & Lang*, no. 1438): Nova Scotia, damp places, Halifax Harbor, September 2–6, 1901 (*Howe & Lang*, no. 1481): Maine, boggy meadow, Cutler, August 29, 1902 — type (*M. L. Fernald*): New Hampshire, marshy places, Alstead, August 9, 1899 (*M. L. Fernald*, no. 323): Vermont, swales near Bread Loaf Inn, Ripton, September 11, 1899 (*E. Brainerd*): Rhode Island, Cumberland, September 13, 1903 (*J. M. Greenman*, no. 1803): Connecticut, alluvial soil, Selden's Cove, Lyme, July 28, 1902 (*C. H. Bissell*): New York, upland marshy pasture, 3 miles south of Utica, August 8, 1900 (*J. V. Haberer*, no. 1496): Ontario, east of Windsor, July 30, 1901 (*J. Macoun*): Michigan, swamps, Alma, August 30, 1893 (*C. A. Davis*).

Rynchospera macrostachya Torr., var. **inundata** (Oakes), n. comb. "Corymbs almost wholly terminal. Clusters loose, few flowered. This variety appears at first sight like a distinct species. Grows in deeper water than the common one, which is the cause of its different appearance. West pond, Plymouth, Mass. Mr. Tuckerman, 1839. The common form is very abundant, at the same locality." Oakes in Hovey's Mag. vii. 185 (1841).— *Ceratoschoenus macro-*

[1] Proc. Am. Acad. xxxiv. 498–501 (1899), & Rhodora, i i 15–16 (1900).

stachys Torr., *β inundatus* Oakes, l. c. *C. macrostachyus*, var. *patulus* Chapm. Fl. 529 (1860). *Rynchospora corniculata* (Lam.) Gray, var. *patula* Britton, Trans. N. Y. Acad. Sci. xi. 84 (1892). *R. macrostachya*, var. *patula* Chapm. Fl. ed. 3, 556 (1897).

This well known southern plant, reaching its northern limit at Plymouth, has a superficial resemblance to *R. corniculata*, but in its bristle characters it is identical with *R. macrostachya*, which is frequent in the Cape Cod region, and according to Oakes was abundant at the same locality as his original material of var. *inundata*. *R. corniculata* with short stout bristles is unknown, on the other hand, north of Delaware.

Scleria pauciflora Muhl., var. **kansana**, n. var. Very slender and pubescent: each group of tubercles consisting of two uniform ones and a third smaller one.— Kansas, sandy soil, Cherokee County, 1896 (*A. S. Hitchcock*, no. 864). Resembling var. *caroliniana* (Willd.) Wood, but differing in the presence of the third small tubercle at each angle of the disk, the angles of *S. pauciflora* and its var. *caroliniana* each bearing 2 distinct uniform tubercles.

Carex **hormathodes**, n. name. *C. straminea*, var. *aperta* Boott. Ill. iii. 120, t. 385 (1862). *C. straminea*, var. *tenera* Bailey, Bot. Gaz, x, 381 (1885), & Mem. Torr. Bot. Club, v. 94 (1894); not Boott, Ill. iii. 120, t. 384. *C. tenera*, Britton in Britton & Brown, Ill. Fl. i. 358, fig. 870 (1896); Fernald, Proc. Am. Acad. xxxvii. 474, figs. 31, 32 (1902); not Dewey, Am. Jour. Sci. viii. 97, (1824), & ix. t. c, fig. 9 (1825).

Carey, Boott and some other distinguished students of *Carex* contemporary with Dewey, recognized his *C. tenera* as identical with the plant we now understand as *C. straminea* Willd. (not Schkuhr). Recent authors have, however, considered it as identical with the larger primarily coastal plant with the perigynia about 10 nerved on either face,— the plant described and illustrated by Boott as *C. straminea*, var. *aperta*. The recent accession by the Gray Herbarium of the Carices of the late Chester Dewey has made it possible to gain a clearing though somewhat surprising light upon this subject. Dewey ordinarily indicated his type specimen by "(Mihi)" after the specific name and later, very shortly before his death apparently, he added to the labels the word "original" in a very dark ink. In the cover of *Carex tenera* most of the material is clearly of one species. Two of the plants are indicated by Dewey as the basis of his species. One bears the label "*C. tenera* (Mihi). Sill. Journ. Vol. viii" and the later

"original"; the other is labeled "*C. tenera* D. Saddle Mt. [Williamstown, Massachusetts], June 20" and the usual word "original" added. On other labels of similar plants sent to him by various collectors,— Sartwell, Macoun, and others — Dewey has written "yes," etc. These plants are mostly quite identical with the "original" specimens and the species is clearly the plant which was understood as *C. tenera* by Carey, Francis Boott, and others who had material from Dewey. This plant as already indicated is identified with the Willdenovian *C. straminea.*[1] Thus since the name *C. tenera* Dewey can no longer be applied to the larger plant to which it has recently been transferred, and the name *aperta* applied by Boott to the plant, as a variety of *C. straminea*, is already used in the genus, it becomes necessary to designate the species by some other name; and on account of the usually elongate moniliform inflorescence this coastal plant is here called *C. hormathodes*, of which the following varieties are noteworthy.

C. hormathodes, var. **invisa** (W. Boott), n. comb. *C. straminea*, var. *invisa* W. Boott, Bot. Gaz. ix. 86 (1884). *C. tenera*, var. *invisa* Britton in Britton & Brown, Ill. Fl. i. 358 (1896).

C. hormathodes, var. **Richii** (Fernald), n. comb. *C. tenera*, var. *Richii* Fernald, Proc. Am. Acad. xxxvii. 475, figs. 33, 34 (1902).

Carex retroflexa, Muhl., var. **texensis** (Torrey), n. comb. *C. rosea*, γ *texensis* Torr. Ann. Lyc. N. Y. iii. 389 (1836), *nomen nudum*. *C. texensis* Bailey, Mem. Torr. Bot. Club, v. 97 (1894).

C. rosea Schkuhr and its varieties, *radiata* Dewey, and *minor* Boott, have their perigynia with minutely serrulate margins, the scales blunt, and the spikes mostly remote. *C. retroflexa* and its var. *texensis*, on the other hand, have the perigynia with smooth margins, the scales acuminate, and the spikes mostly approximate. In no character do they seem to differ except in the outline of the perigynia, those of *C. retroflexa* being broadly ovoid, of var. *texensis* lance-ovoid to lance-subulate. Though occasional transitional plants occur the two seem to be fairly marked extremes, the variety standing in the same relation to the species as *C. stellulata*, var. *angustata* Carey, *C. interior*, var. *Josselynii* Fernald, *C. granularis*, var. *Haleana* (Olney) Porter, *C. vesicaria*, var. *Raeana* (Boott) Fernald, &c. to the broad-fruited types of their respective species. The occurrence of *C. retroflexa*, var. *texensis* throughout the southern range of the species — from Kentucky

[1] See Fernald, Proc. Am. Acad. xxxvii. 450 (1902).

to Missouri and southward — suggests that it may be found also in the more northern range of the species which extends northward to Massachusetts and southern Ontario.

Carex setacea Dewey, var. **ambigua** (Barratt), n. comb. *C. vulpinoidea*, var. *ambigua* Barratt according to Boott, Ill. iii. 125, t. 406 (1862). *C. xanthocarpa* Bicknell, Bull. Torr. Bot. Club, xxiii. 22 (1896).

This plant was beautifully illustrated by Francis Boott from Connecticut specimens and there can be no question from the plate and notes of the identity of Barratt's *C. vulpinoidea*, var. *ambigua* with Mr. Bicknell's *C. xanthocarpa*. An abundant series of material in the herbarium of Chester Dewey of his own *C. setacea* and of Sartwell's *C. scabrior* shows that while the best *C. setacea* (including *scabrior*) has ordinarily dull brown or drab lanceolate or lance-ovate perigynia tapering gradually to the serrulate beak, many specimens pass very definitely either in color or in the outline of the perigynia to a commoner plant which in its best development has the broad-ovate to orbicular perigynia abruptly short-beaked and often golden-brown in color, the latter character suggesting the name *xanthocarpa*. The transitions between these two extremes are so numerous that it seems to the writer that they are best treated as phases of one plant rather than as distinct species.

(*To be continued.*)

MEETING OF THE JOSSELYN BOTANICAL SOCIETY.

Edward B. Chamberlain.

The twelfth annual meeting of the Josselyn Botanical Society of Maine, was held on July 3d to 7th inclusive at Rowe Pond Camps, some ten miles distant from Bingham, Maine. Sixteen members and friends were present at the meetings. During the day, excursions were made to the various ponds, bogs and woodlands in the vicinity, the evenings being devoted to the business meetings of the society. Upon Wednesday evening, Mr. John Murdock, Jr., addressed the society upon the subject of forestry.

On the trip to the Camps from Bingham, a short stop was made at Huston Brook Falls, where some of the members explored the limey-slate ledges, finding several interesting plants. Other favorable localities were found along the western shore of Bean Pond, where the dwarf mistletoe was very abundant, and along the stream and "dead-waters" leading from Jewett Pond. The latter place was especially rich in sedges. The following list includes the more important species secured; all localities are in Pleasant Ridge Township, Somerset Co., Maine.

Swartzia montana, Lindb.
Splachnum ampullaceum, L.
Bartramia Œderi, Swartz.
Hylocomium umbratum, Ehrh.
Preissia commutata, Nees.
Equisetum pratense, Ehrh.
Carex canescens subloliacea, Laestad.
" *Crawfordii*, Fernald.
" *exilis*, Dewey.
" *lenticularis*, Michx.
" *mirabilis tincta*, Fernald.
Carex oligosperma, Michx.
" *pauciflora*, Lightf.
Scirpus occidentalis, Chase.
Corallorhiza multiflora flavida, Peck.
Habenaria bracteata, R. Br.
Arceuthobium pusillum, Peck.
Ribes Cynosbati, L.
Viola pallens, Banks.
" *Brainerdii*, Greene.
Hippuris vulgaris, L.
Pyrola minor, L.

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Vol. 8, no. 90, including pages 117 to 136 and plates 71 and 72, was issued 28 July, 1906.

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JOURNAL OF

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SOME MAINE RUBI. THE BLACKBERRIES OF THE KENNEBUNKS AND WELLS,— II.

W. H. Blanchard.

Ten species and one variety are considered in this paper and the *Hispidus* and *Setosus* classes must be left for a third paper. The first six of the following species are erect "high" blackberries belonging to four distinct classes two of which are new; and the remaining four are recurving and tipping, forming three equally distinct new classes.

* Erect Blackberries, recurving slightly or not at all; never tipping.

+ The *Nigrobaccus* class. Inflorescence a long tapering open raceme.

Rubus nigrobaccus, Bailey. This is abundant and fruits well in parts of Wells, but is generally occasional only, though it occurs in all situations down to the edge of the ocean. Wherever found it has plainly the distinguishing characteristics of the species, and does not seem to intergrade with or into anything else as Prof. L. H. Bailey has taught. It is very pubescent and hairy with stalked glands on all parts often even on the surfaces of the leaves. The new canes have strong furrowed stems, often branched, with stout straight prickles set on the ridges at a right angle, and 5-foliate light yellow-green leaves, the leaflets mostly ovate and long-stalked. The old canes are pyramidal in outline, the leaf branches closely resembling new canes. The inflorescence is a long tapering raceme nearly leafless, very loose and open, the pedicels set at a great angle to the axis. The petals are long and narrow, the fruit long and tapering; a good fruit having from 60 to 100 small drupelets each about ⅛ in. in diameter; very aromatic but very seedy.

Rubus orarius, n. sp. Plants large and very erect, pyramidal in outline with stout furrowed stems. Glabrous or somewhat pubescent; glandless or somewhat glandular on the inflorescence. Leaflets broad; fruit large and useful, in large open racemes.

New canes. Stems strong, erect, 3 to 6 feet high, dark red, often branched, glabrous and glandless, angled and deeply furrowed. Prickles few, 3 to 5 to the inch of stem, short, stout and strong, straight, set perpendicular to it and on its sharp angles. Leaves large often 9 in. long and 8 in. wide, 5-foliate, rather thick; dark yellow-green, glabrous or somewhat hairy on the upper surface, and glabrous or more or less finely pubescent and lighter beneath. Leaflets broadly oval or ovate, long-stalked, outline entire, taper-pointed, finely and doubly serrate-dentate; the middle one broadest often slightly cordate, the side ones narrower and rounded at the base; the basal ones smaller and broadly cuneate at the base. Petiole and petiolules large, grooved more or less, pubescent; prickles few, short and hooked; the petiolule of the middle leaflet 1½ in. long, the side ones one-half as long and the basal ones ⅛ in. long.

Old canes. Little changed, prickles intact. Cane pyramidal in outline, the new growth consisting of nearly leafless racemes at the upper part of the stem and long leafy branches below resembling new canes, generally one from each old leaf axil. Axis of long leaf-branches zigzag, terete, pubescent, prickles few and straight. Leaves 3-foliate or some of the outer 5-foliate resembling those on new canes. Racemes 3 to 5 in. long; axis straight, stout, pubescent, glandless or with few sometimes many stalked glands; prickles few, small and straight; pedicels similar, slender, 1 in. long, set at a great angle and subtended by small bracts; leaves two or three, very small, trifoliate and unifoliate. Flowers appearing the last week in June, large and showy; 1¼ in. broad; the petals oblong-oval two thirds as wide as long; sepals wide, mucronate or acuminate, reflexed. Fruit beginning to ripen Aug. 5 and continuing a long time, broad-cylindric, drupelets large, $\frac{3}{16}$ in. in diameter or sometimes but ⅛ inch. Two measured and counted: ½ in. long by ⅝ in. broad, 23 drupelets; ⅝ in. high and ½ in. broad, 43 drupelets. Edible and valuable.

Type station Cape Porpoise post-office and from thence up the Biddeford road in Kennebunkport, Maine. Quite variable and abundant in Wells, Kennebunk and Kennebunkport. Moist or dry ground, in open sun or light shade.

This broad-leaved blackberry is well distinguished from *R. nigrobaccus* by its broad petals, short fruit, dark yellow-green leaves and in its being nearly or entirely lacking in pubescence and stalked glands. It is the species that furnishes most of the fruit actually picked where *R. nigrobaccus* is scarce.

+ + The *Argutus* class. Inflorescence a short raceme with short stout unequal pedicels.

Rubus amnicolus n. sp. Plants erect, tall, recurved at the top, glandless, well-armed, pubescent. Fruit large, cylindrical; drupelets large. Inflorescence a raceme leafy at the base.

New canes. Stems stout, erect, recurved above, 4 to 5 feet high, 6 to 8 feet long, reddish, glabrous and glandless, well angled and furrowed. Prickles strong, straight, needle-pointed, $\frac{3}{16}$ in. long, 6 to 10 to the inch of stem, set at a right angle to the stem and on its angles only. Leaves large, 8 in. long by 7 in. wide, 5-foliate, quite thick; yellow-green with appressed hairs but smooth on the upper surface, and lighter and very softly pubescent beneath. Leaflets stalked, broad-oval, outline entire, taper-pointed, ciliate, finely somewhat doubly serrate-dentate; the middle leaflet one-half as wide as long, often wider, rounded or slightly cordate at the base; the side ones nearly one-half as wide as long, broad at the base; and the basal ones similar in shape or broad-pointed at the base and smaller. Petiole and petiolules stout, glandless, grooved, thinly pubescent; prickles numerous, strong, hooked; the petiolule of the middle leaflet averaging 1 in. long, the side ones one-half as long, the basal leaflets on very short stalks.

Old canes. Erect, mostly killed back, often badly, prickles intact. Normally pyramidal in outline, one bud developing from each old leaf axil. New growth on the upper part of the cane consisting of a short close raceme at the end of an axis 3 to 6 in. long, the shorter set the farther up the cane; the lower part of the cane occupied by leafy branches resembling the new canes, the basal ones 1 ft. or more long, the upper ones 6 in. Axis of fruit branches stout, straight, terete, glandless, very pubescent or woolly; prickles few and small, strong and hooked; the racemes short, close; pedicels short, stout, pubescent, glandless, set at a great angle to the axis, subtended by small bracts; the leaves small and few, trifoliate with nearly oblong leaflets. Axis of leaf branches nearly terete, stout, nearly straight, pubescent; prickles few, straight and small; leaves very similar in color, texture, pubescence, serration and form to those on new canes, mostly quinate, a few at the base of the branch trifoliate with wide leaflets, petioles and petiolules very pubescent; mostly tipped with a little loose inflorescence. New growth on badly killed-back stems consisting of long leaf branches tipped with late flowers, several from each old leaf axil giving the cane a peculiar form. Flowers rather large, $1\frac{1}{8}$ to $1\frac{1}{4}$ in. broad, petals oval to oblong, $\frac{5}{8}$ in. long and rather more than one-half as wide as long, appearing the last of June, those on killed-back branches continuing till the middle of July. Fruit short-cylindric, about $\frac{1}{2}$ in. high and broad, of 15 to 20 large drupelets. Ripe early in August.

Type stations: The Rosin dump below the Leatheroid shop and the sand lot above Hope Cemetery in Kennebunk village, Maine. Abundant on the meadows of the Mousam river below the village and occurring in other places. Open sun, dry and moist ground.

This species is well distinguished from *R. nigrobaccus* and *R. orarius* by its long recurving stem, lack of glands, narrow leaflets

and close racemes ending more or less leafy branches. It seems to prefer localities not far from streams and winter-kills badly, sending out an abundance of long leafy branches tipped with late flowers. It bore abundantly in 1904 but in 1905 the crop was a failure.

+ + + Inflorescence a short raceme with slender equal pedicels.

Rubus glandicaulis, n. sp. Plants very erect, pubescent, and all parts except the leaf blades thickly covered with stalked glands. Inflorescence a very regular raceme with long thread-like pedicels. Fruit cylindrical with rather small drupelets.

New canes. Stems strong, thick, very erect, 3 to 6 feet high, or often dwarfish, dark red, often branched, remarkably glandular, 5-angled and slightly furrowed. Prickles ⅛ in. long, 10 to 15 to the inch of stem, straight, backward slant slight, set in lines on the angles. Leaves large on strong plants 8 in. long by 7 in. wide, average smaller, nearly coriaceous when mature, rather thin; on the upper surface shining dark yellow-green with appressed hairs but very smooth to the touch; velvety beneath with abundant short pubescence. Leaflets nearly oval, the three upper stalked, outline entire, long taper-pointed; finely and slightly doubly serrate and serrate-dentate; the middle one broad, rounded at the base, sometimes ovate, rarely nearly cordate, two thirds as wide as long; the side ones oval, twice as long as wide; the basal leaflets similar in shape but smaller. Petiole and petiolules yellow, stout, grooved; prickles stout, hooked, numerous, in lines; covered thickly with stalked glands; proper pubescence little or none; the petiolule of the middle leaflet 1 in. long, the side ones ½ in. long, the basal leaflets sessile.

Old canes. Erect as ever, prickles and stalked glands often much broken. Normally pyramidal in outline, the second year's growth consisting of nearly naked racemes at the top of the cane, these succeeded by racemes leafy at the base, and below these long leafy branches often destitute of inflorescence and resembling new canes. Upper racemes 4 to 6 in. long; axis straight, terete, very pubescent and glandular; prickles few straight and slender; pedicels 8 to 16, slender, thread-like, very pubescent and glandular, set at an angle of about 45° to the axis, 1 in. long, subtended by small bracts; at the base of the raceme a few small trifoliate and unifoliate leaves, the leaflets about 1 in. long. The lowest branches often over 1 ft. long; axis nearly terete, yellow, zigzag, pubescent, glandular; prickles few and weak. Leaves 3-foliate, the leaflets broad-oval; those at the end of the branch 5-foliate, leaflets narrow; petiole and petiolules slender, pubescent and glandular, prickles slender; in color, texture, pubescence and serration similar to those on new canes. Intermediate branches increasing regularly in length and leafiness downwards, the amount of inflorescence decreasing slightly, the leaflets on these branches long and narrow. Normally one axis from each old leaf-

axil but often several. Flowers $1\frac{1}{8}$ to $1\frac{1}{4}$ in. broad, petals oval from $\frac{9}{16}$ in. long by $\frac{5}{16}$ in. wide to $\frac{5}{8}$ in. long by $\frac{5}{16}$ in. wide; appearing late in June and continuing on the lower branches till the middle of July. Fruit ripe Aug. 8, continuing to ripen in favorable places till Sept. 1; cylindrical, regular, of good size; drupelets rather small from $\frac{1}{8}$ to $\frac{3}{16}$ in. in diameter. Four out of many counted and measured: $\frac{11}{16}$ in. high by $\frac{7}{16}$ in. broad, 40 drupelets each from $2\frac{1}{2}$ to 3 sixteenths in. in diameter; $\frac{11}{16}$ in. by $\frac{7}{16}$ in., 56 drupelets each $\frac{1}{8}$ inch; $\frac{11}{16}$ in. by $\frac{8}{16}$ in., 43 drupelets each 2 to $2\frac{1}{2}$ sixteenths inches; $\frac{11}{16}$ in. by $\frac{8}{16}$ in., 36 drupelets. Very edible.

Type station on the railroad and highway from the shoe-shop to the depot in Kennebunk, Maine. Abundant in Wells, Kennebunk and Kennebunkport and especially abundant in the road and adjoining fields from Cape Porpoise to Kennebunkport village. Dry ground in open sun and light shade.

This very glandular species can be distinguished from *R. nigrobaccus* at a glance by its narrow leaflets, smooth and shining above, and its slender equal pedicels set at a small angle to the axis.

Rubus amabilis, n. sp. Plants quite erect, nearly unarmed, glandless, very glabrous. Inflorescence a very regular raceme with short thread-like pedicels. Fruit cylindrical, drupelets large or small.

New canes. Stems stout, strong, very erect, soft, 3 to 5 feet high, often a dwarf, reddish, glabrous and glandless, very smooth, 5-angled and furrowed. Prickles very small and slender, straight, hardly noticeable, 5 to 8 to the inch of stem, on its angles only. Leaves large, 8 in. long by 7 in. wide, 5-foliate, rather thick; dark green with a few appressed hairs when young, then glabrous and very smooth on the upper surface; lighter green, glabrous and smooth beneath. Leaflets narrowly obovate or sometimes oval rarely ovate, the upper ones stalked, outline entire, long taper-pointed, finely slightly doubly serrate and serrate-dentate; the middle one broadest, nearly one-half as wide as long, narrow but rounded at the base; the side ones three times as long as wide, cuneate at the base; the basal leaflets similar in shape but smaller. Petiole and petiolules rather stout, grooved, glabrous, glandless, unarmed, prickles minute or wanting; the petiolule of the middle leaflet 1 in. long, the side ones one-third as long, the basal leaflets sessile.

Old canes. Erect as ever, prickles mostly wanting, soft, reddish. Generally pyramidal in outline, the second year's growth consisting of short leafless or nearly leafless racemes or sometimes a short leaf branch at the top of the cane, and long leaf branches resembling new canes at its base, with polymorphous growth between; one from the axil of each old leaf except as described below. The upper racemes 3 or 4 in. long, glandless, axis straight, terete, prickles minute or wanting, finely pubescent with 12 to 30 slender, thread-like, finely-pubescent pedicels $\frac{1}{2}$ in. long, set at an angle of 45° to it, subtended

by broad conspicuous bracts, leafless or with one or two small trifoliate or unifoliate glabrous leaves at its base. The lowest branches often over 16 in. long, axis nearly terete, yellow, zigzag, glabrous and very smooth; 3-foliate, the leaflets very broad-oval, long-pointed, thin, rather coarsely serrate-dentate, the outer leaves often quinate. Intermediate growth consisting of several forms mixed: rather long racemes similar to the upper but with pedicels 1 in. long and more leaves; long leafy branches tipped with similar racemes; short leaf branches bare of inflorescence; and short naked racemes subtended by one of the latter two forms; the leaves mostly trifoliate with long obovate pointed leaflets, or broad unifoliate leaves, all dark green, glabrous and coarsely serrate-dentate. Flowers rather large, $1\frac{1}{4}$ to $1\frac{1}{2}$ in. broad; petals $\frac{8}{16}$ to $\frac{11}{16}$ in. long and one-half as wide or a little wider, oval or abruptly narrowed at the ends; sepals gradually narrowed to a long point, glabrous outside, woolly inside; opening June 25–July 5, and continuing on inflorescence-tipped branches till July 15. Fruit cylindrical, very variable in size, the drupelets from $\frac{2}{16}$ to $\frac{3}{16}$ in. in diameter. Six measured and counted: $\frac{11}{16}$ in. high by $\frac{8}{16}$ in. broad, 35 drupelets; $\frac{11}{16}$ in. by $\frac{9}{16}$ in., 30 drupelets; $\frac{8}{16}$ in. by $\frac{7}{16}$ in., 18 drupelets; $\frac{12}{16}$ in. by $\frac{9}{16}$ in., 37 drupelets; $\frac{3}{8}$ in. by $\frac{3}{8}$ in., 10 drupelets; $\frac{7}{16}$ in. by $\frac{6}{16}$ in., 22 drupelets. Ripe Aug. 21 and continuing to ripen till Sept. 1 on late flowering branches. Very edible, productive. Perhaps worthy of cultivation.

Type stations: Grove depot, Kennebunk, Maine; Arundel depot, Kennebunkport; Kennebunk village on the highway from the shoe-shop to the depot. Abundant in Wells, Kennebunk and Kennebunkport. Also in North Berwick. Thrives in pastures or hedges, moist or dry places, open sun or light shade.

This species has a resemblance to *R. glandicaulis*, but is nearly unarmed, is quite glandless and glabrous, and has slightly obovate leaves and shorter pedicels. It has no noticeable resemblance to *R. Canadensis*, L. except in its being nearly unarmed, dark green, glabrous and glandless, while the shape of the leaflets, height of plant, form of inflorescence and fruiting season are entirely different.

+ + + + Inflorescence a short raceme ending a leafy branch.

Rubus peculiaris, n. sp. Plants erect, recurving slightly, very glabrous, glandless, armed with very numerous prickles. Inflorescence a raceme ending a leafy branch. Fruit irregularly globose, drupelets large. Leaves thick, leathery.

New canes. Stems stout, strong, erect but somewhat recurved above, $2\frac{1}{2}$ to 4 ft. high, often a dwarf, reddish, glabrous, glandless, 5-angled, not furrowed. Prickles very numerous, $\frac{1}{16}$ to $\frac{1}{8}$ in. long, 50 to the inch of stem, strong bristle-prickles, not confined to the angles, straight with a slight backward slant. Leaves large, 8 in.

long and 7 in. wide, quite thick, leathery; deep dark green, perfectly glabrous and very smooth on the upper surface; lighter but not more yellow and very glabrous and smooth beneath. Sometimes a few appressed hairs above and on the veins beneath. Leaflets narrowly oval, often appearing obovate, cuneate at the base, the upper ones stalked, outline entire, long taper-pointed, shallowly sometimes doubly serrate or slightly serrate-dentate; the middle one twice as long as wide, the others about three times as long as wide. Petiole and petiolules stout, grooved, glabrous, glandless, or the petiolules slightly pubescent, prickles numerous, very slender and hooked, the petiolule of the middle leaflet $\frac{3}{4}$ in. long, the side ones one-third as long, and the basal leaflets nearly sessile.

Old canes. Erect as ever, brown, prickles not intact, points gone, stem often nearly smooth. New growth consisting entirely of leafy fruit branches, 3 in. long at the top of the cane and 10 in. long at the base each tipped with inflorescence. Axis irregularly angled, zigzag, glabrous with a few very small and very weak prickles, glandless. Leaves few, 3-foliate or some upper ones unifoliate; the leaflets long, narrow, pointed, cuneate and nearly entire at the base, serrate or serrate-dentate, rather thick, dark green and glabrous above, lighter green beneath, the middle one short-stalked, the unifoliate leaves similar, or often very broad and deeply 3-lobed. One strong branch from each old leaf axil, or nearly as often especially below, two or more slender ones with less inflorescence, generally very zigzag, one often blossoming late; the whole second year's growth angular, irregular, mixed and unique. Inflorescence glandless, of rather regular racemes, 1 to 2 in. long, with finely pubescent axis and 8 to 12 short, stout, finely pubescent pedicels set at varying angles to the axis and subtended by large, conspicuous and leaflike bracts. Also much smaller and irregular inflorescence on lower branches and secondary branches above. Flowers, appearing the first week in July and continuing two weeks on late branches, rather large, $1\frac{1}{8}$ to $1\frac{1}{4}$ in. broad, petals $\frac{5}{8}$ in. long by $\frac{5}{16}$ in. wide, oval, oblong-oval, or obovate. Fruit ripe Aug. 15, irregularly globose, composed of 3 to 20 large drupelets each $\frac{3}{16}$ in. in diameter or often larger, a nice fruit being $9\frac{1}{2}$ sixteenths in. in diameter with 21 drupelets.

Type stations: Saco Road Methodist Church at Arundel depot, Kennebunkport, Maine, and on Main Street, Kennebunkport village at the guideboard to Cape Porpoise by the sea road. Abundant in Kennebunk and Kennebunkport. Dry ground, open sun or light shade.

This species as summarized in the opening paragraph has little resemblance to any other species of high blackberry and forms a class by itself.

* * Canes recurving and tipping.

+— Leaves pubescent; stems little prostrate,

Rubus Arundelanus, n. sp. Plants very pubescent with occasional stalked glands on the inflorescence, the stems nearly terete, hard, recurving and tipping. Leaves thick, the margins somewhat plicate; those on old canes very irregular in form.

New canes. Stems thick, glandless and glabrous, very smooth, nearly terete, reddish green, hard, erect, 2 to 4 feet high, recurving, often tipping, frequently branched. Prickles rather slender, strong, straight, slanted slightly backward, $\frac{1}{8}$ to $\frac{3}{16}$ in. long, 5 to 10 to the inch of stem, set in lines on the angles of the stem or pith. Leaves 5 to 7 in. long and wide, 5-foliate, thick; light yellow-green with numerous hairs and rough on the upper surface, lighter with copious long pubescence and very velvety beneath. Leaflets broad-oval or rhomboidal, overlapping, outline wavy or slightly incised, margins somewhat plicate, taper-pointed, dentate or serrate-dentate, the teeth narrow and long with long points, the central tooth of the shallow lobes very long; the middle leaflet very broad, often short-ovate approaching orbicular, with sometimes a tendency to divide into three leaflets, broadly rounded sometimes nearly cordate at the base; the side ones broad-oval, oblique-angled at the base; the basal ones oval, broadly cuneate. Petiole and petiolules large, faintly grooved, very hairy-pubescent, glandless, prickles strong often large, recurved; the petiolule of the middle leaflet generally less than an inch long, the side ones about one-third as long, and the basal leaflets sessile.

Old canes. Stems reddish green, strong, hard to cut, prickles intact. New growth consisting of leafy branches from 3 to 10 in. long tipped with inflorescence, or rarely a pure leaf branch, regularly graded, the short ones terminal, generally one from each old leaf-axil. Axis of branches straight or often zigzag, angled, copiously pubescent with occasional stalked glands; prickles numerous, rather large, strong and somewhat hooked; leaves 3-foliate, the upper unifoliate, thick; light yellow-green with some hairs on the upper surface, lighter and very pubescent beneath; leaflets varying greatly in size and shape, often very broad, irregularly and shallowly incised, coarsely dentate or serrate toward the base, the unifoliate narrow or often broad and deeply incised. Inflorescence on a short axis, cymose-corymbose or cymose-racemose; pedicels very pubescent with occasionally a stalked gland, 6 or 8 set at a small angle or erect, and an erect one from the axil of each lower leaf, subtended by unifoliate leaves and narrow bracts, or some by nothing. Flowers appearing about July 1 large, $1\frac{1}{4}$ to $1\frac{1}{2}$ in. broad; petals broadly oval, one-half as wide as long; sepals broad, very pubescent, mucronate or acuminate. Fruit ripening about Aug. 10 and continuing in fruit about two weeks, globose, $\frac{1}{2}$ in. in diameter, drupelets large, $\frac{3}{16}$ in. in diameter.

Type stations: The field ten rods west of the Casino in Kennebunkport village, Maine; in the road north of Cape Porpoise village; and on the ledges around the Old Orchard House at Old Orchard. Also several other stations some very large in Kennebunk and Kennebunkport. Open places, rich or poor or on rocks.

This species resembles the *Recurvans* class in the size and shape of the new cane, but has a hard stem and strong prickles while the leaves are very hairy and pubescent, the leaflets overlapping, thick and somewhat plicate on the margins. This and the form following may well be considered a distinct class.

Rubus Jeckylanus, n. sp. Plants very pubescent with occasional stalked glands on the inflorescence, stems nearly terete, hard, recurving and tipping. Leaves thick, leaflets broad, branches of old canes very leafy.

New canes. Stems thick hard and woody, smooth, glabrous and glandless, nearly terete, 2 to 4 feet high, erect at first then recurving, often tipping, sometimes branched. Prickles slender, strong, $\frac{1}{8}$ in. to $\frac{3}{16}$ in. long, slanted slightly backward, about 8 to the inch of stem, set in lines over the angles of the pentagonal pith or on the slight angles of the stem. Leaves 5-foliate, 5 to 7 in. long and wide, thick; yellow-green with appressed hairs but smooth on the upper surface; and whiter and very velvety with abundant long pubescence beneath. Leaflets broadly oval or ovate, greatly overlapping, only the middle leaflets noticeably stalked, outline entire, taper-pointed, singly dentate or serrate-dentate, the teeth long-pointed; the middle leaflet broadly ovate and cordate; the side ones broad-oval, oblique-angled at the base; the basal ones very broad and wide-angled at the base; the leaflets all being about two-thirds as wide as long. Petiole and petiolules large, grooved, very villous-pubescent, glandless; prickles numerous, strong and hooked; the petiolule of the middle leaflet less than 1 in. long, the side ones about $\frac{1}{8}$ in. long, the basal leaflets sessile.

Old canes. Stems hard to cut, reddish green, prickles intact. Second year's growth polymorphous, consisting of long leafy branches often 12 to 18 in. long normally growing near the base of the cane sometimes tipped with inflorescence; short nearly or quite leafless inflorescences from 1 to 3 in. long normally borne toward the end of the cane; and leafy inflorescences situated between the two other kinds; but these three forms and others not described often much mixed, and any form occurring frequently at any point; generally one from the axil of each old leaf, but frequently the first and last occur together. Axis of leafy branch straight or zigzag, angled, pubescent; prickles small, strong, slightly hooked; leaves 3-foliate, large, leaflets broad, mostly oval, the middle leaflet very short-stalked, resembling those on new canes in other respects. Axis of leafy fruit branches thick, straight or zigzag, very villous-pubescent, glandless; prickles small and somewhat hooked; leaves numerous, trifoliate, the upper unifoliate; in color, texture and pubescence like those on new canes; the middle leaflet stalked; leaflets broad-oval, finely or coarsely serrate-dentate, the unifoliate leaves very broad often approaching orbicular; inflorescence short, cymose-corymbose, pedicels very pubescent with often a few stalked glands, 6 or 8, short, set at a

small angle to the axis, subtended by unifoliate leaves and small bracts. The short inflorescences quite similar. Flowers appearing July 1, from 1 to 1¼ in. broad; petals oblong-oval, two-thirds as wide as long; sepals broad, very pubescent, mucronate or acuminate. Fruit ripening about Aug. 10, globose, drupelets large, maturing this year but little and that very poor.

Type stations: near Arundel railroad station in Kennebunkport, Maine, and Grand View Hill west of the Casino in Kennebunkport village. Frequent throughout the village and especially abundant along the shore from Spouting Rock to Cape Arundel. Also at the Granite Quarry in Biddeford. Open places in dry or rich ground, dwarf or large.

The new canes resemble those of *R. Arundelanus*, but the old ones are unique in their polymorphous and mixed characteristics.

+- + Leaves glabrous; stems much prostrate.

Rubus biformispinus, n. sp. Plants decumbent at length trailing, with stems thick at the base, glabrous but very glandular, and with very broad leaflets and distinct primary and secondary prickles, very savage to touch.

New canes. Stems thick and erect at the base, angled but not furrowed, soon decumbent and then trailing, tipping in September; trailing over bushes, fences or on the ground; glabrous but very glandular; dark red on the upper side and green beneath. Prickles of two kinds: primary ones strong, $\frac{3}{16}$ in. long, with stout base, 5 to 10 to the inch of stem, straight, on the angles, with slight backward slant or none; secondary prickles short, strong, of varying lengths set at random, the smallest tipped with glands. Glands numerous, their stalks unequal in length, tapering. Leaves about 6 in. long and wide, 5-foliate, rather thick; dark green, glabrous and slightly shining on the upper surface; lighter green but not yellowish, and glabrous beneath. Leaflets very broad, oblong-oval, taper-pointed, stalked, outline entire; finely, sharply and mostly singly serrate-dentate; the middle one broadest often nearly orbicular and slightly cordate near the petiolule; the side ones a little narrower, oblong-oval or rhomboidal, more narrowly rounded at the base; the basal ones similar in shape but smaller and more narrowly rounded at the base. Petiole and petiolules stout, strong, grooved; dark red on the upper side, green-yellow beneath; glabrous; prickles strong and hooked continued on the midribs; the abundant secondary prickles and glandular covering like that of the stem; the petiolule of the middle leaflet about 1 in. long, the side ones one-third as long, and the basal leaflets short stalked but not sessile.

Old canes. Stem faded, primary prickles intact, secondary ones considerably impaired; in favorable places the old leaves often remaining. New growth entirely of leafy horizontal fruit branches well

graded in length; those near the root 1 foot long, the terminal ones 2 to 4 in., nearly pure racemes. Axis of terminal growth nearly straight, angled, hairy, glanded hairs abundant; prickles numerous, strong and slightly hooked; leaves one or two trifoliate or the outer unifoliate, thick, shining and glabrous; leaflets broad-oval, pointed at each end, coarsely serrate-dentate; petiole glanded, prickles recurved, the middle leaflet stalked; inflorescence a short raceme, pedicels 8 to 12, about $\frac{5}{8}$ in. long, set at an angle of 45°, rather thick, with numerous glands, subtended by rather large bracts. Axis of long branches straight or zigzag, terete; prickles small strong and hooked; glands numerous or scanty. Leaves large, 3-foliate, resembling those on new canes in color, texture, serration and pubescence; leaflets broad like those on new canes, the side ones sessile and very broad with slight lobing on the lower side. Inflorescence shorter, less regular or nearly wanting. Flowers appearing about July 5 on the main inflorescence, but much later on the long leafy branches, about 1 in. broad or often some less; petals very broad, oblong or approaching orbicular; sepals broad, bright green, mucronate; glabrous and glandless outside, pubescent inside on the proper inflorescence; but narrow and often leafy-tipped on long leafy branches. Fruit ripening normally the middle of August, globose, $\frac{3}{8}$ to $\frac{7}{16}$ in. in diameter, drupelets 11 to 16, about $\frac{3}{16}$ in. in diameter, but little maturing this year.

Type station near the guide-board at the intersection of Main St. and the ocean road to Cape Porpoise in Kennebunkport village, Maine, abundant here and down the Cape Porpoise road for a mile and frequent throughout the entire village. Open sun in dry ground.

This species is remarkable in many ways and must be put in a class by itself.

Rubus multiformis, n. sp. Plants with thick stems and very long, wide-branched canes, decumbent or erect at first, then creeping a long distance on the ground and tipping. Leaves often skeleton-like; the leaflets being so long, narrow and long-stalked.

New canes. Stems thick and erect at the base, 2 to 4 feet high, angled and furrowed, green-brown, glabrous, glanded or unglanded; soon recurved, trailing on bushes, fences or on the ground, tipping in September, 6 to 12 feet long with numerous long branches. Prickles rather short, on the angles, about 5 to the inch of stem, slanted backward; the glandular form with small secondary prickles. Glands on slender stalks, numerous on some plants, wanting on others. Leaves skeleton-like, 7 in. long and 6 in. wide, 5-foliate, thin; glabrous or with a few appressed hairs and light green often shining on the upper surface; glabrous, rarely slightly pubescent beneath. Leaflets narrow, long-oval, long-stalked, long taper-pointed, outline entire, finely slightly doubly serrate-dentate; the middle one widest, the blade nearly one-half as wide as long and rounded at the base; the side ones

much narrower, cuneate and slightly rounded at the base; the basal ones smaller and more sharply cuneate. Petiole and petiolules large, strong, glabrous, glanded on some, faintly grooved, prickles strong and hooked; the petiolule of the middle leaflet over 1 in. long, the side ones over one-half as long, the basal ones short-stalked but never sessile.

Old canes. Stems brown, prickles intact. New growth consisting of erect, leafy fruit branches, or stemlets, 5 in. to 3 feet high, well graded from the short terminal ones to the tall ones on the thick part of the stem, usually one from each old leaf axil. Axis of short branches angled, glabrous, or on some glanded, prickles minute; leaves 3-foliate, the upper unifoliate, pointed at each end, resembling those on new canes in other respects; inflorescence a broad raceme, pedicels 8 to 12, nearly glabrous, set at a great angle to the axis, and subtended by narrow unifoliate leaves and long narrow bracts. Long branches appearing like new canes; axis straight or zigzag; leaves 5-foliate, in all respects like those on new canes; the pedicels subtended mostly by narrow unifoliate leaves. Flowers appearing July 1 and continuing on the long branches for two or three weeks, about 1 in. broad, showy; the petals oblong-oval, one-half as wide as long; sepals broad, mucronate or pointed. Fruit beginning to ripen Aug. 5 and continuing to ripen through the month, short-cylindric, composed of large drupelets $\frac{3}{16}$ in. in diameter. Three measured and counted: $\frac{1}{2}$ in. high by $\frac{7}{16}$ in. broad, 23 drupelets; $\frac{3}{8}$ in. by $\frac{5}{16}$ in., 10 drupelets; $\frac{7}{16}$ in. by $\frac{7}{16}$ in., 18 drupelets. Very edible.

Type stations: Moss's Corner and Old Fort Inn in Kennebunkport village, Maine. Also found at other places in the same village, at Cape Porpoise and forms of it at Old Orchard and in Wells. Open sun and light shade, dry ground.

This species is probably but one of a distinct class of blackberries more or less trailing, with angled stems and long narrow leaflets.

One form which is often quite prostrate with much shorter petiolules and is a very delicate-looking plant frequent throughout this section may be considered for the present as a variety and named described as

Var. delicatior, n. var. Plants glabrous and glandless, the new canes with smaller and fewer prickles, more decumbent, often entirely prostrate; leaflets smaller, shorter stalked and more delicate; the old canes with shorter new growth; the long branches or stemlets rarely over 1 ft. high with trifoliate not quinate leaves, and the shorter and terminal ones with a very slender axis and narrower leaflets.

Type found on the electric railroad 75 rods east of the Town House junction, Kennebunkport, and in the roads and fields about it. Frequent in Kennebunk, Kennebunkport and Wells. Dry ground in sun or light shade.

WESTMINSTER, VERMONT.

SOME NEW OR LITTLE KNOWN CYPERACEAE OF EASTERN NORTH AMERICA.

M. L. Fernald.

(*Continued from page 167.*)

Carex setacea Dewey, var. **ambigua** (Barratt), n. comb. *C. vulpinoidea*, var. *ambigua* Barratt according to Boott, Ill. iii. 125, t. 406 (1862). *C. xanthocarpa* Bicknell, Bull. Torr. Bot. Club, xxiii. 22 (1896).

This plant was beautifully illustrated by Francis Boott from Connecticut specimens and there can be no question from the plate and notes of the identity of Barratt's *C. vulpinoidea*, var. *ambigua* with Mr. Bicknell's *C. xanthocarpa*. An abundant series of material in the herbarium of Chester Dewey of his own *C. setacea* and of Sartwell's *C. scabrior* shows that while the best *C. setacea* (including *scabrior*) has ordinarily dull brown or drab lanceolate or lance-ovate perigynia tapering gradually to the serrulate beak, many specimens pass very definitely either in color or in the outline of the perigynia to a commoner plant which in its best development has the broad-ovate to orbicular perigynia abruptly short-beaked and often golden-brown in color, the latter character suggesting the name *xanthocarpa*. The transitions between these two extremes are so numerous that it seems to the writer that they are best treated as phases of one plant rather than as distinct species.

Carex **Harperi**, n. sp. Similar to *C. leptalea* Wahl.: the capillary culms 2.5 to 7 dm. long; the more crowded spike with strongly overlapping linear-oblong perigynia (4 to 5 mm. long): the acuminate scales whitish: the achenes puncticulate, barely lustrous, sharply trigonous.— Georgia, springy place in swamp of Rocky Comfort Creek, near Louisville, Jefferson County, April 9, 1904 (*R. M. Harper*, no. 2109): Florida, without locality (*Chapman*); bogs and swamps, Apalachicola (*Chapman* in Biltmore Herb. no. 271b): Alabama, Gateswood, May 1, 1903 (*S. M. Tracy*, no. 8656): Mississippi, Coopolis, April 24, 1898 (*S. M. Tracy*, no. 4122): Louisiana, without locality (*Hale*): Texas, without locality (*Wright*).

C. leptalea is a common plant of northern cold swamps and bogs, extending form Newfoundland to British Columbia, south to Pennsylvania, the Great Lakes and Missouri, and in the mountains to

North Carolina, Colorado and Oregon. *C. Harperi*, on the other hand, is a plant of the southern coastal plain, which may be expected to extend along the coast or in the Mississippi Basin considerably north of its present known range. Its chief points of distinction, already enumerated, may be contrasted with those of *C. leptalea* as follows: the perigynia of *C. Harperi* are 4 to 5 mm. long and strongly overlapping, those of *C. leptalea* 2.5 to 3.5 mm. long and subalternate; the scales of *C. Harperi* are whitish and acuminate, those of *C. leptalea* brownish and mostly obtuse or obtusish; the achenes of *C. Harperi* puncticulate, barely lustrous, and sharply angled, those of *C. leptalea* lustrous, not puncticulate, and obtusely angled.

Carex virescens Muhl. "in lit." was published almost simultaneously and with essentially identical descriptions by Willdenow[1] and by Schkuhr,[2] each citing the other's publication. From their descriptions "spica androgyna lineari pedunculata inferne mascula, femineis subapproximatis binis subpedunculatis linearibus,. . . . fructibus globoso-triquetris obtusis pubescentibus . . . . Capsulae *maturae virides subnervosae pubescentes*," and from the detailed drawing of the plant in Schkuhr's work there is no question of the plant Muhlenberg had in hand.

There are two extreme variations of *Carex virescens*. One has 2 to 4 linear-cylindric spikes, 2 to 4 mm. thick, the terminal one (including the staminate base) 1.8 to 4 cm. long, and from $\frac{1}{10}$ to $\frac{1}{7}$ as thick. The other has 2 to 5 oblong-cylindric to subglobose spikes 3 to 5 mm. thick, the terminal one 9 to 18 mm. long and from $\frac{1}{5}$ to $\frac{1}{3}$ as thick. The perigynia of the slender-spiked plant are somewhat costate, of the thicker spiked plant less so, or nearly nerveless. These two plants are ordinarily well marked but numerous transitional specimens show them to be varieties of one species, and they are usually so treated though by some authors they are accepted as distinct species: the shorter- and thicker-spiked plant as *C. virescens*, the longer- and slender-spiked plant as var. *costata* Dewey (*C. costellata* Britton). With the exception of Dewey, the earlier students of American Carices — Torrey, Carey, Boott, and others — made no strong distinction between the plants, though Boott, in his Illustrations, recognized the

[1] Willd. Sp. iv. 251 (1805).

[2] Schkuhr, Riedgr. Nachtr. 45, t. Mmm. fig. 147 (1806).

slender-spiked plant as true *C. virescens* illustrating that plant in full, and showing as an extreme form the inflorescence of the thicker-spiked plant. Subsequent authors, on the other hand, have followed the lead of Dewey in treating as true *C. virescens* the short-spiked plant, while the plant with elongate linear-cylindric spikes has been regarded as a variety (var. *costata* Dewey) or as a species (*C. costellata* Britton). It needs only a brief examination of the original description and figures, however, to show that in so doing, recent authors have treated the wrong plant as *C. virescens;* and that the plant of Muhlenberg, beautifully illustrated by Schkuhr, was the long-spiked extreme which is now passing as *C. virescens,* var. *costata* Dewey, or *C. costellata* Britton. The other, the short-spiked plant, which is one of the commonest and most attractive sedges of New England, is apparently without a name, and in recognition of the long and painstaking study of the group by the scholarly New England botanist, Charles Walter Swan, it may appropriately be called

C. VIRESCENS, var. **Swanii**, n. var. Usually lower than the species, 1.5 to 8 dm. high: the 2 to 5 oblong-cylindric to subglobose spikes 3–5 mm. thick; the terminal one (including the staminate base) 9 to 18 mm. long, $\frac{1}{5}$ to $\frac{1}{3}$ as thick.— *C. virescens* of recent authors.— Dry banks and copses, southern Maine to Ontario and southward. M. A. Day's no. 202 from Manchester, Vermont, may stand as the type of this variety.

CAREX LAXICULMIS Schwein., var. **copulata** (Bailey), n. comb. *C. retrocurva,* var. *copulata* Bailey, Herb. distr. no. 161 (1886). *C. digitalis,* var. *copulata* Bailey, Mem. Torr. Bot. Club, i. 47 (1889).

This variety as first designated by Professor Bailey on the label of his no. 161, from Lansing, Michigan, in 1886 was supposed to include "all our western plants" of the *digitalis-laxiculmis* (*retrocurva*) group. The particular plant (no. 161) in question was greener than most of the *C. laxiculmis* (*retrocurva*) of the coastal states and this point was strongly emphasized by Professor Bailey, who later, on account of the green not glaucous foliage of the plant transferred it to varietal rank under *C. digitalis.* Subsequent collections show that the plant may sometimes be glaucous,— as for example, material in the Gray Herbarium from Alma, Michigan, Erie County, Ohio, Port Stanley, Port Dover and Leamington, Ontario; — and specimens of what is in all other points typical *C. laxiculmis* of the Atlantic States,— from Waverly and Jamaica Plain, Massachusetts — show that the eastern

plant is not always glaucous. In fact the glaucous or non-glaucous foliage is not a satisfactory basis for the separation of *C. laxiculmis* and *C. digitalis*. The basal leaves, however, seem to furnish a very accessible character, a large series of *C. digitalis* having the basal leaves from 2 to 5 mm. broad, while an equally full representation of *C. laxiculmis* shows the basal leaves to vary in breadth from 6 to 12 mm. The western tendency of this species differs from the coastal plant, however, in a character which seems to be fairly constant in the material at hand. True *C. laxiculmis,* which occurs from southern Maine to Virginia and Missouri, principally in the coastal states, has perigynia 2.8 to 3 mm. long. The more characteristic plant of the interior, which may well retain the varietal name, *copulata,* first applied to an extreme specimen from Michigan, occurs from the Champlain Valley in Vermont to Delaware and west to Ohio, Michigan and Ontario, and has the perigynia distinctly larger, 3.3 to 4 mm. long.

CAREX LAXIFLORA Lam., var. **leptonervia**, n. var. Slender, 1.5 to 7 dm. high: leaves 0.5 to 1 cm. broad: pistillate spikes linear-cylindric, loosely-flowered, 1 to 2.5 cm. long; the 2 or 3 upper crowded at the base of the staminate; the lower remote: perigynia oblong-fusiform, nerveless or with 1 to 3 faint nerves on each face.— Newfoundland to Ontario, south to northern and central New England, central New York, and Minnesota and along the mountains to North Carolina and Tennessee. A northern extreme of the species differing from all the other varieties of *C. laxiflora* in its nerveless or only slightly nerved perigynia. The following from among very numerous specimens examined are characteristic. NEWFOUNDLAND, Birchy Cove, Bay of Islands, June 22, 1895 (*A. C. Waghorne*, no. 8): QUEBEC, Allen's Ravine, Mt. Albert, Gaspé Co., August, 1905 (*J. F. Collins & M. L. Fernald*): NOVA SCOTIA, Boylston, July, 1890 (*C. A. Hamilton*): MAINE, low woods, Fort Fairfield, July 6, 1893 — type (*M. L. Fernald*, no. 146): NEW HAMPSHIRE, Mt. Washington, altitude 3500 feet, July 9, 1888 (*E. & C. E. Faxon*): VERMONT, low open woods, New Haven, June 5, 1898 (*E. Brainerd*): MASSACHUSETTS, Shirley (*W. P. Conant*): CONNECTICUT, sphagnum bog, Winchester, June 25, 1901 (*C. H. Bissell*): NEW YORK, Pickerel Pond, near Axton, June 29, 1899 (*Rowlee, Wiegand & Hastings*); Penn Yan, 1862 (*Sartwell*): ONTARIO, Niagara, May 14, 1901 (*J. Macoun*, no. 33,697): MINNESOTA, Two Harbors, June, 1893 (*E. P. Sheldon*): NORTH CAROLINA, thickets, Waynesville, June 9, 1897 (Biltmore Herb. no. 1796a): TENNESSEE, on the higher regions of the Smoky Mts., May, 1844 (*F. Rugel*, no. 103).

(*To be continued.*)

A New Variety of Carex trisperma.— During the recent meeting of the Josselyn Botanical Society of Maine at Rowe Ponds Camps a party, including Edward B. Chamberlain, John Murdoch, Jr., Robert A. Ware, and myself with Sam Rollins as guide, visited Jewett Brook Bog, some distance below Jewett Pond of which it forms a part of the outlet. While on this trip a peculiar little sedge, growing at the foot of a small shrub in Sphagnum moss in the direct sunlight, attracted my attention. The setaceous or filiform appearance of the foliage and the very few scattered perigynia, mostly only one to a spikelet and not more than two spikelets to a plant, made its appearance very distinct from any other Carex with which I was acquainted. Other small clusters of the plant were collected in similar situations, and finally specimens were seen showing all stages of transition to typical *Carex trisperma* which grew abundantly some distance back under the trees, thus showing conclusively that the plant in question was only a very distinct form of *Carex trisperma*.

It seems fitting that this new variety should be recognized by a name, and I propose to dedicate it to one who has been my companion on many a woodland tramp, one who has shown the greatest enthusiasm in seeking to increase our knowledge of the occurrence and distribution of the plants of the Penobscot Valley, and whose persistent seeking has resulted in many additions to the flora of this region. It is with great pleasure on my part that opportunity is given me to name this new plant for my friend, Mr. Francis M. Billings of Bangor. I would therefore call it.

Carex trisperma Dewey, var. **Billingsii**, new var.

Culms filiform, 1 to 2 dm. long; leaves 0.3 to 0.5 mm. wide, usually much overtopping the culm; spikelets one or two in number, usually one- but sometimes two-flowered; the finely many-nerved perigynia from 2.5 to 3.3 mm. long, 1.6 to 1.8 mm. broad, exceeding the scale by one-fourth to one-third its length. Habitat — Sunny spots in a mossy bog, Jewett Brook Bog, about a mile below Jewett Pond, (presumably in Pleasant Ridge Plantation) Maine, collected July 5, 1906 (*Chamberlain, Murdoch, Rollins, Ware & Knight*); type No. 5066 O. W. K.— O. W. Knight, Bangor, Maine.

THE PERIANTH OF RYNCHOSPORA CAPILLACEA VAR. LEVISETA.

E. J. Hill.

In Rhodora for July, 1906, p. 130, there is a statement in Prof. Fernald's article on some *Cyperaceae* that does not agree with my experience with *Rynchospora capillacea* var. *leviseta*. Mentioning *Cyperaceae* without bristles it states: "In a few regions, the Kennebec Valley, Maine, Lake County, Indiana, etc., *Rynchospora capillacea* consistently lacks the perianth and is var. *leviseta* Hill." Reference is also made to a previous article in Rhodora iii. 250 (1901), where the statement occurs: "In *Rynchospora capillacea* var. *leviseta* the reduced bristles lack the barbellate character found in otherwise undistinguishable spikes." Never having noticed this lack, or reduction of perianth I was a little surprised. Although I had examined a great many specimens at various times in order if possible to find some with barbed bristles, the absence or reduction of the perianth had never been remarked in plants collected about Lake Michigan. To see if I had overlooked the matter, after reading the article I went over my collections, taking various spikelets from different sheets to see how they fared in this respect. They had been carefully scrutinized at the time of collecting for smoothness of bristles.

My collections from Lake County, Ind., are six, three from Pine, the original locality, made in 1875, 1876 and 1880; two from Whiting, made in 1880 and 1881, and one from Edgemoor, 1881. The area it frequents here has not proved to be large, the extremes about six miles apart. North of Chicago, in Lake County, Ill., I have made three collections, two at Wauconda, made in 1898 and 1903, and one from Waukegan, 1905. I have a single plant found with the barbellate form at Brownstown on Grand Traverse Bay, Michigan. All the stations are less than a mile from Lake Michigan except Wauconda about seventeen miles west of Waukegan, where the plant grows by Bangs Lake, which is tributary to Fox River, and therefore in the basin of the Mississippi. These comprise all the stations where I have seen it. They mostly show myriads of examples, since the plants usually grow in dense masses. But in those which lie west of Lake Michigan I have not yet found a case with barbed bristles. Having

found one of the smooth bristled forms among the barbed at Brownstown naturally led to expect the reverse, which may yet be the case. The plants kept for the herbarium by no means comprise all cases of examination, since I have been frequently over ground where some of them grow and have tested them for the purpose of discerning any change in character. I have also collected or examined the barbellate form from three localities in Michigan, all contiguous to Lake Michigan; Peteskey and Brownstown in 1878, and Benton Harbor, 1895. Both the typical form and the variety occur in other parts of the state, as recorded in Beal's Michigan Flora.

What now do these collections show with regard to the lack of perianth or its reduction. There are generally from 2 to 6 akenes in a spikelet, mostly 4 or 5. I have met with but one akene without a perianth, and that in a spikelet where the rest were provided with one. The number of bristles when counted was so uniformly six that I ceased at length counting in all cases, but noted the length in both smooth and barbellate forms. The length is apt to vary in the same akene, the difference being covered by the length of the tubercle, a bristle rarely falling short of its base or exceeding its tip. Nor could I discern any difference in this respect in the two forms. The arrest of development was limited to the barbs. Though I am necessarily confined to my herbarium for the data regarding the number and length of bristles, it does not follow with respect to their absence, since in cases examined and not preserved the lack of a perianth would have been noticed, as it would have removed the crucial test for the variety.

Perhaps so small a matter hardly deserved so full a treatment, but it has a taxonomic value on the constancy of a varietal character, more so than many by which species are delimited. The specimens taken in different years from the same locality and from the various localities themselves prove this for the plants as they occur about the head of Lake Michigan. For the thirty years it has been under observation it comes true to seed, whatever may be its variations elsewhere.

Chicago, Ill.

Habenaria macrophylla in Maine.— Mr. Ames in his recent article (Cf. Ames, Rhodora, Jan. 1906, pp. 1–5) in which he so clearly distinguishes *Habenaria macrophylla* Goldie from *Habenaria orbiculata* Torrey does not seem to have data of the occurrence of *H. macrophylla* in Maine. While Mr. F. M. Billings and the writer were on a recent trip he found two plants of this species growing in low rich evergreen woods, which are now in my herbarium. (No. 5124, Herb. O. W. K., Bucksport, Maine, July 21, 1906, *Billings & Knight*). The species however had been previously collected in Maine as examination of the collection of Maine plants at the University of Maine shows a typical specimen collected in "Rich woods, Monmouth, July 31, 1897, by E. D. Merrill."

In this connection it may be well to state that I have recently seen specimens of *H. orbiculata* in the herbarium of the University of Maine, from Oldtown and Harrison and have it in my own possession from Holden and Sebois. There seems to be no doubt that both species are widely distributed in the State.— Ora W. Knight, Bangor, Maine.

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ACROCHAETIUM AND CHANTRANSIA IN NORTH AMERICA.

F. S. Collins.

Dr. E. Bornet has recently published a short but important paper[1] which will do much to bring order in a group where confusion has long reigned. Twenty-six species are accepted by him in the two genera, and are grouped according to their characters; they are all based on specimens in the Thuret herbarium, and full descriptions are given of only two species; some of the others have brief notes, but the rest have names alone, or names with references to numbers in exsiccatae. The paper is thus of value chiefly in connection with a large herbarium, well supplied with authentic and classical material. While retaining the older names, the species are grouped largely according to characters that had little weight with or were quite disregarded by the authors of the species, so that original references, or the collected descriptions in the Sylloge Algarum of De Toni, are of little use in critical cases. In the following pages an attempt is made to arrange the North American marine species according to the principles of Bornet's paper, and to give descriptions of all, which should enable the student to determine them from the living plant. Only 12 species have yet been recorded in this region, North America including the West India Islands; and this should be borne in mind in using the key; for instance, *Acrochaetium Dictyotae* is the only name given in the key for an asexual plant, with descending endophytic branches, but no trace of the original spore; four other species of this character are known

[1] Deux Chantransia corymbifera Thuret. Acrochaetium et Chantransia; par M. E. Bornet, Bull. Soc. Bot. de France, Vol. LI, p. XIV.

sparingly branched, branches erect, secund, sometimes slightly tapering, hairs not observed; spores 9 × 16 μ, sessile on the upper side of the branches, solitary or sometimes in secund series, one on each cell of the branch; at the base of each primary filament a rounded cell, the original spore, emitting a short, descending process, sometimes branched, of a few small rounded cells, attached to the host. On *Dasya elegans* (Mart.) Ag., Wood's Hole, Mass., Sept. 2, 1905.

This is the only species of *Acrochaetium* in which the spore is persistent; the color being the same as that of the host, there is nothing to show the presence of the *Acrochaetium* without microscopic examination. No authentic specimen has been seen of Harvey's plant on *Dasya*, but there is every reason to suppose that if Harvey had seen this species, he would have included it in his *Callithamnion virgatulum*; it is, however, distinct from the *C. virgatulum* of Wyatt, Algae Danmonienses, No. 189, which must be considered as authentic.

A. Alariae (Jónsson) Bornet, l. c., p. XIX; *Chantransia Alariae* Jónsson, Botanisk Tidsskrift, Vol. XXIV, p. 132, fig. 1; *C. secundata* Phyc. Bor.-Am., No. 236. Filament arising from a single cell, naked below, usually densely branched above, branches opposite, alternate or secund; sterile filaments often bearing hairs; filaments about 16 μ diam. below, 8 μ above, cells 1–3 diam. long below, up to 6 diam. long in sterile branches. In fertile branches uniformly short often clavate, each cell bearing two opposite, sessile spores about 14 × 20 μ, a similar spore terminal on the branch. On *Alaria esculenta*, Maine and N. H.

A. Sagraeanum (Mont.) Bornet, l. c., p. XXI; *Cladophora Sagraeana* Montagne, Sylloge Algarum, p. 459; *Chantransia virgatula* P. B.-A., No. 39. Basal layer of contorted and entangled filaments, from which arise erect filaments, 6–10 μ diam., cells 4–8 diam. long, branching not very dense, the lowest branches longest, upper gradually shorter, all rather erect, bearing short secund ramuli above the axils; spores borne on the ramuli, about 10 × 15 μ, one or two on each articulation. Conn., W. I., Florida, Southern California.

The ramification is like that of *A. Daviesii*, but the basal layer is quite different.

A. flexuosum Vickers, Ann. Sci. Nat., Series 9, Bot., Vol. I, p. 60. Forming dense globular tufts, with basal entangled horizontal filaments, from which arise erect flexuous filaments, 10 μ diam., branching above, branches gradually shorter upwards, in secund series,

erecto-patent, cells 2–3 diam. long; spores secund on the ramuli. On *Chaetomorpha*, N. J., Barbados.

In dimensions, and in arrangement of spores like *A. secundatum*; basal layer different.

A. Dictyotae n. sp. Filis primariis 12–14 μ crassis; ramulis 10–12 μ; longitudine cellularum inferne 1½ diam. aequante, ad 4 diam. superne; ramulis plerumque secundatis, parum attenuatis, plerumque obtusis; monosporis 14 × 20 μ, in filis sessilibus in loco ramuli, vel 1–3 terminalibus in ramo uni- vel bicellulari; cellulis ad basin frondis rotundatis vel subquadratis, interdum in discum coalitis plures frondes sustinentem; disco fila irregularia emittente, stratum corticalem plantae hospitis penetrantia, inter cellulas magnas internas repentia, interdum usque ad superficiem oppositam attingentia.— Main filaments 12–14 μ diam.; ramuli 10–12 μ; cells from 1½ diam. below to 4 diam. above; branches mostly secund, not much tapering, usually with rounded tips; spores 20 x 14 μ, sessile on the filament in the place of a branch, or one to three at the end of a one- or two-celled branch. At the base the cells are rounded or squarish, sometimes forming a disk from which arise several fronds; and from which irregular filaments issue, penetrating the cortical layer of the host, and passing between the large internal cells, sometimes extending through to the surface on the other side. On *Dictyota Binghamiana* J. Ag., in tide pools near high water mark, La Jolla, California, Aug. 21, 1899. Mrs. E. Snyder.

No other of our species has so extensive an endophytic portion.

A. VIRGATULUM (Harv.) Bornet, l. c., p. XXII; *Callithamnion virgatulum* Harvey in Hooker, British Flora, Vol. II, p. 549; *Trentepohlia virgatula* Farlow N. E. Marine Algae, p. 109. One to many filaments arising from a basal disk; filaments 10–14 μ diam. below, long and straight, with rather few long straight erect branches, 6–8 μ diam. near the end, usually terminating in a very slender hair; cells about 3 diam. long below, about 6 diam. in the branches; short ramuli, mostly 1–3-celled, abundant, scattered, opposite or in short secund series, bearing either hairs or terminal spores; spores also sessile on the branches, occupying the places of ramuli, 12 × 20 μ. On various algae, Maine to N. J.

The long subsimple branches, with short ramuli or spores on nearly every cell, and the abundant hairs, are the chief characteristics of the species. The branches do not gradually taper into the hairs;

the last cell of the branch is of about the same size as the preceding cells, and the much more slender hair is sharply distinct from it.

Forma **luxurians** (J. Ag.) n. comb.; *Callithamnion luxurians* J. G. Agardh, Species Algarum, Vol. II, p. 14; Harvey, Nereis Bor.-Am., part 2, p. 242; *Trentepohlia virgatula* var. *secundata* Farlow, N. E. Marine Algae, p. 109; *Chantransia virgatula* Farlow, Anderson & Eaton, Alg. Am.-Bor. Exsicc., No. 157. Instead of isolated tufts, this form occurs as an uniform continuous fringe on the edge, rarely on the surface of *Zostera marina* L.; the basal disk practically continuous. Gloucester, Mass., to Bridgeport, Conn.

Forma **tenuissima** (Collins) n. comb.; *Chantransia virgatula* forma *tenuissima* Collins, P. B.-A., No. 741. Filaments arising from a small disk, about 8 μ diam. at base, cells about 3 diam. long; branches sometimes frequent near base, infrequent above, often infrequent throughout; long and virgate, gradually tapering to about 4 μ, with cells 8–10 diam. long, not ending in hairs; spores 8 × 20 μ, sessile or on a one-celled pedicel, scattered or in short secund series. On *Zostera*, San Pedro, California, Nov., 1898.

A. Daviesii (Dillw.) Nägeli, Morph. & Syst. der Ceramiaceae, p. 412; *Conferva Daviesii* Dillwyn, British Confervae, p. 73; *Callithamnion Daviesii* Harvey, Nereis Bor.-Am., part 2, p. 243; *Trentepohlia Daviesii* Farlow, N. E. Marine Algae, p. 109; *Chantransia Daviesii* P. B.-A., No. 880. Base a small cellular disk, one layer thick, bearing several filaments, about 10–12 μ diam. near base, not much smaller upwards; branches abundant, largely secund, rather erect; cells 2–4 diam. long; spores 10–12 × 15–20 μ, sessile or on short pedicels in close series on the upper side of the branches at their base; hairs more or less abundant. Forming fringes along the edge of *Rhodymenia palmata* (L.) Grev., and occasionally on other algae.

The arrangement of the spores in this species distinguishes it from all others except *A. Sagraeanum*, which has a different basal portion.

A. secundatum (Lyngb.) Nägeli, l. c., p. 414; *Callithamnion Daviesii* var. *secundatum* Lyngbye, Hydr. Dan., p. 129; *Chantransia secundata* P. B.-A., No. 1088, not 236. Base a cellular disk, usually two layers thick; filaments several from the same disk, 9–12 μ diam. below, simple for a short distance, then densely branched, branches rather patent, long and short intermixed, at first secund, later often opposite, 6–8 μ diam. near the end, which often bears a hair; cells 1½–2 diam. long in main filaments, 2–3 in the branches; spores 10 × 18 μ,

sessile or short pedicelled, secund or sometimes opposite. On various algae, especially on *Porphyra*, Maine to Conn.

In size of filaments and spore characters like *A. virgatula*, but a much shorter and more densely branched plant, with uniformly shorter cells, and branching predominantly secund.

Key to the Species of Chantransia.

1. Unchanged spore persistent at base of filament. . . . 2.
1. Spore indistinguishable. . . . . . *C. efflorescens.*
   2. Monoecious. . . . . *C. roseolum.*
   2. Dioecious. . . . . 3.
3. Cells 3–10 diam. long; descending endophytic filaments well developed. . . . . *C. corymbifera.*
3. Cells 2–3 diam. long; endophytic filaments only slightly developed. . . . . *C. Barbadensis.*

C. corymbifera Thuret in Le Jolis, Algues Marines de Cherbourg, p. 107; Notes Algologiques, p. 16, Pl. V; P. B.-A., No. 1040, not 192. Filaments erect and straight, about 8 μ diam., slightly tapering above; branches few below, more abundant above, alternate or somewhat secund, virgate, not much branched, cells 3–10 diam. long; spores sessile or short pediceled, near the base of the branch; cystocarps in the form of dense glomerules of naked spores, in the same situation; antheridia on separate plants, in dense, short-pediceled glomerules at various points on the branches.

The original spore, 12–15 μ diam. persistent at the base of the filament, sending down into the host a branching filament, about the size of the erect filament, but more irregular and contorted; erect filaments arising from this endophytic growth, but distinguished from the primary filament by not possessing the spore cell. On *Helminthocladia purpurea*, Southern California.

C. Barbadensis Vickers, Ann. Sci. Nat., Series 9, Bot., Vol. I, p. 60. Basal spore persistent; endophytic filament not much developed; erect filaments 12–14 μ diam., cells 2–3 diam. long; fruit as in *C. corymbifera*. Barbados, Guadeloupe.

C. roseola (Crouan) Bornet, l. c., p. XIX; *Ceramium roseolum* Crouan in Desmazières, Plantes Crypt. de France, No. 1040. Basal spore distinct, emitting descending filaments penetrating the host, and erect filaments with more or less secund branches; cystocarpic

glomerules lateral on the main filaments, spermatangia on special ramuli in the vicinity. On *Myriocladia*, Guadeloupe.

C. efflorescens var. Thuretii Bornet, l. c., p. XVI. *C. corymbifera* P. B.-A., No. 192. Frond arising from a basal disk, filaments 9–10 μ diam. below, slightly less above, branching from the base, branches alternate or secund, often ending in a hair; fertile branches one or more at the axil of a branch, simple or forked, bearing one or two spermatangia at the end; the trichogyne developed on a lower cell, succeeded by a dense glomerule of carpospores. On *Ceramium rubrum* and *Cystoclonium purpurascens*, Marblehead to Gay Head, Massachusetts.

Malden, Massachusetts.

THE NOMENCLATURE OF THE NEW ENGLAND LAURACEAE.

B. L. Robinson.

The application of the rules of nomenclature, which were carefully framed by the International Botanical Congress at Vienna, necessitates many minor changes in current usage. The general tendency of the rules, however, is decidedly conservative and it is believed that all botanists who are seriously anxious for a unified nomenclature will endeavor to apply these rules with care and accept with patience any changes which they impose. It is also to be hoped that such alterations may be made in a manner to be as clear and convincing as possible. For this reason individual cases, involving complicated synonymy, may be appropriately discussed in some detail.

The attractive early-flowering Spice Bush or Benjamin Bush, common from New England southward and westward, has of late been passing in America under two scientific names, viz., *Lindera Benzoin*, the designation adopted in the later editions of Gray's Manual, and *Benzoin Benzoin* (L.) Coulter, the name employed in some more recent works. Neither of these binomials can be maintained under the Vienna rules, and it is therefore worth while to

examine the claims of the various competing names borne by the plant in the past. As to the generic names, they have been as follows:—

Laurus L. Spec. Pl. i. 370 (1753).

Benzoin Fabric. Enum. Meth. Pl. Helmstad. ed. 2, p. 401 (1763).

Lindera Thunb. Diss. Nov. Gen. 44 (1783).

Laurus, subg. *Euosmus* Nutt. Gen. i. 258 (1818).

Evosmus Reichenb. Conspec. 87 (1828).

Benzoin Nees ex Wall. Pl. As. Rar. ii. 63 (1831), and Laurin. Expos. 17 (1833).

Calosmon Presl in Kostel. Allg. med. pharm. Fl. ii. 477 (1833).

Of these generic names the earliest, i. e. *Laurus*, was used by Linnaeus to cover very different elements and is now properly limited in its application to the genuine laurel and closely allied species. The earliest post-Linnaean description of *Benzoin* by Fabricius in 1763 appears to have been generally overlooked until attention was called to it by Kuntze, Rev. Gen. ii. 568 (1891). No mention of this early publication of the genus *Benzoin* occurs in Bentham & Hooker's Genera, in the Index Kewensis, in Pfeiffer's admirable and extraordinarily complete Nomenclator, or in Mez's monographic treatment of the *Lauraceae*. Not having access to the rare second edition of Fabricius's Enumeratio methodica plantarum horti medici Helmstadiensis, the writer applied to Professor William Trelease of the Missouri Botanical Garden for a transcription of the treatment of *Benzoin* in that work. The copy which he very kindly sent runs as follows:—

" **Benzoin* Boerh. Ind. alt. Arbor virginiana, citrei vel limonii folio, Benzoinum fundens Commelin. H. A. I. F. 97. virginiana, pisaminis folio, baccata, Benzoinum redolens Plucknet. Phytogr. T. CXXXIX. f. 3. Laurus foliis enerviis, ovatis, utrinque acutis, integris, annuis L. Sp. 9. Flores ante folia, vel statim cumeis prodeunt, ex una gemma plures, ut plurimum 3. vel 4. e viridi lutescentes, pedunculati, 4. plerumque bracteis ovatis, concoloribus, stipati, propter parvitatem difficilius cognescendi, certo tamen hermaphroditici, corolla ex 6. vel 8. laciniis vel petalis constante. Numerus filamentorum incertus, 8. vel 9. Antherae aureae splendentes, tuberosae. Germen, stilus & stigma Lauri. Nectarium & glandulae Linnaeanae vix distinguendae."

From this description it will be seen that the genus *Benzoin* was briefly but adequately described in 1763 and that, both from the characters given and the synonymy cited, there can be no doubt whatever

of the application of the name even at this early date to our common Spice Bush. The later generic name *Lindera* must therefore fall into synonymy along with the discarded names of *Evosmus* and *Calosmon*.

Our plant has also borne several specific names, as shown by the following synonymy.

Laurus aestivalis L. Spec. Pl. i. 370 (1753).
" *Benzoin* L. Spec. Pl. i. 370 (1753).
" *fragrans* Salisb. Prod. 344 (1796).
" *Pseudo-Benzoin* Michx. Fl. Bor.-Am. i. 243 (1803).
Benzoin odoriferum Nees ex Wall. Pl. As. Rar. 63 (1831).
Benzoin Benzoin Coult. Mem. Torr. Bot. Cl. v. 164 (1894).

Of these names *aestivalis* enjoys not only priority of time over all but *Benzoin*, but priority of position over the latter name, since it has precedence on the page of Linneaus's Species Plantarum. It is true that this last matter is of little importance, since the combination *Benzoin Benzoin* is inadmissible according to the Vienna rules, but it may be remarked incidentally that this "duplicate monomial" (to employ an apt expression of the late Mr. Redfield) cannot stand even according to the Rochester Code which by giving weight to priority of position would necessitate the adoption of *Benzoin aestivale*. This is, therefore, one of the happy cases in which two sets of rules lead through different courses of reasoning to the same result, namely that Benzoin aestivale (L.) Nees is the correct name of our Spice Bush.

In employing the two names *Laurus aestivalis* and *L. Benzoin*, Linnaeus of course believed that he was applying them to two different plants, both collected by Clayton in Virginia, but the differences, not very clearly stated in the brief and formal Linnaean descriptions, have not been found reliable or significant in the light of subsequent study. The two species have been reduced to one by the best monographers of the group; and Mr. James Britten, who at the British Museum of Natural History has access to Clayton's original specimen of *B. aestivale* has been so kind as to verify for the writer its identity with the plant which has long passed as *Lindera Benzoin*.

Unfortunately our other lauraceous species, namely the Sassafras tree must likewise receive an unfamiliar name. The species is best know as *Sassafras officinale* Nees & Eberm., although in recent years some botanists have called it *Sassafras Sassafras* (L.) Karsten.

Neither of these names is applicable under the Vienna rules, the former because *officinale* is not the earliest specific name, the latter because a specific name may not exactly duplicate the generic. The synonymy is as follows:—

Laurus Sassafras L. Spec. Pl. i. 371 (1753).
" *variifolia* Salisb. Prod. 344 (1796).
Euosmus albida Nutt. Gen. i. 259 (1818).
Tetranthera albida Spreng. Syst. Veg. ii. 267 (1825).
Persea Sassafras Spreng. l. c. 270 (1825).
Sassafras officinale Nees & Eberm. Handb. med.-pharm. Bot. ii. 418 (1831); Nees, Syst. Laurin. 488 (1836).
Sassafras albidum Nees, Syst. Laurin. 490 (1836).
" *officinarum* J. S. Presl, Rostl. ii. 505 (1846).
Laurus albida Loud. ex Meisn. in DC. Prod. xv. pt. 1, 513, 516 (1864).
Sassafras Sassafras Karst. Pharm.-med. Bot. 505 (1882).
" *variifolium* Ktze. Rev. Gen. ii. 574 (1891)

From this synonymy it is evident that the earliest available specific name is the one used by Salisbury, which has some thirty-five years priority over the current name *officinale*. The species should, therefore, pass hereafter as SASSAFRAS VARIIFOLIUM (Salisb.) Ktze. It is a pleasure to see that this name has already received scholarly recognition by Koehne, who employs it in his admirable Deutsche Dendrologie 172 (1893). The descriptive specific name is happily very appropriate.

GRAY HERBARIUM.

SOME NEW OR LITTLE KNOWN CYPERACEAE OF EASTERN NORTH AMERICA.

M. L. Fernald.

(*Continued from page 184.*)

Carex flava and Oederi. The forms of the polymorphous *Carex flava* group seem never to have been clearly differentiated in American literature. The most satisfactory discussion of the group is that of Professor Bailey;[1] but primarily through his attempt to keep apart as distinct varieties American forms which in their details agree with well known European extremes, his treatment is not entirely satisfactory. Although Professor Bailey maintains that the American forms differ from the European, a comparison of many specimens from both continents fails to convince the writer that there are many distinctively American tendencies in the species. That the plant in America and in Europe should present parallel and undistinguishable variations is in no way surprising. Typical *C. flava* is admitted to occur in America as well as in Europe, and several other tendencies of the group seem to occur on both continents. As understood by the writer the plants of eastern America may be treated as follows.

* Beak as long as the body of the perigynium, often becoming bent or retrorse, at least at maturity.

+ Staminate spike sessile or very short-stalked, sometimes pistillate at tip: pistillate spikes mostly contiguous, the lower sometimes remote.

++ Fruiting spikes 9 to 12 mm. thick, short-oblong or globose; beaks spreading in all directions: scales dark and usually conspicuous.

= Perigynia ovoid, abruptly beaked.

C. flava L. Sp. i. 975 (1753); Bailey, Mem. Torr. Bot. Club, i. 28 (1889).— Newfoundland and Anticosti to Saskatchewan and Alberta, south to Connecticut, New York, Ohio, Michigan and Montana. Europe.

= = Perigynia subulate or conic-subulate, gradually tapering to the beak.

Var. **gaspensis**, n. var. Resembling *C. flava*: the perigynia at first subulate and ascending, later becoming conic-subulate and wide spreading.— A characteristic extreme in the southern part of the Gaspé Peninsula, Quebec: cool gravelly banks of Bonaventure River, August 8, 1904 (*Collins, Fernald & Pease*); wet calcareous marl, Goose Lake, New Richmond, July 17, 1905 (*Collins & Fernald*).

[1] Mem. Torr. Bot. Club, i 28 (1889).

++ ++ Fruiting spikes 6.5 to 8.5 mm. thick, mostly oblong: perigynia spreading and straightish, or the lower strongly retrorse.

Var. RECTIROSTRA Gaudin, Fl. Helvet. vi. 97 (1830). *C. flava,* var. *graminis* Bailey, l. c. 30 (1889).— Newfoundland to Michigan and Rhode Island. Europe.

+ + Staminate spike peduncled; pistillate remote, oblong or subglobose, 6.5 to 9 mm. thick: the curved perigynia spreading or usually strongly retrorse.

Var. ELATIOR Schlecht. Fl. Berol. i. 477 (1823); Bailey, l. c. 28 (1889). *C. lepidocarpa* Tausch, Flora, xvii. pt. i. 179 (1834). *C. flava,* var. *lepidocarpa* Anderss. Cyp. Scand. 25 (1849), & Olney and others in America.— Quebec to Rhode Island and New York. Europe.

* * Beak distinctly shorter than the body of the perigynium, straight or scarcely bent, ascending or horizontally spreading, hardly retrorse.

+ Staminate spike usually peduncled; pistillate scattered, oblong or globose, 5 to 8 mm. thick.

C. OEDERI Ehrh. Beitr. vi. 83 (1791); Bailey, l. c. 29 (1889).— *C. flava, β. Oederi* Schlecht. Fl. Berol. 477 (1823). *C. divisa* Oeder, Fl. Dan. iii. t. 371 (1770), not Huds.— Newfoundland to Hudson Bay and Maine. Introduced on ballast southward. Europe.

+ + Staminate spike usually sessile, often more or less pistillate; pistillate approximate at tip of culm (rarely 1 or 2 remote), globose to oblong.

Var. **pumila** (Cosson & Germain), n. comb. *C. viridula* Michx. Fl. ii. 170 (1803). *C. flava,* var. *pumila* Cosson & Germain, Fl. Par. 602 (1845). *C. Oederi* of most American and many European authors. *C. flava,* subsp. *Oederi, γ cyperoides* Marsson, Fl. Neu-Vorpommern, 537 (1869). *C. flava,* var. *viridula* Bailey, Mem. Torr. Bot. Club, i. 31 (1889) — Newfoundland to British Columbia and Vancouver, south to New England, Pennsylvania, Ohio, Indiana, Idaho, and Washington. Europe.

CAREX RETRORSA Schwein. varies greatly, several varieties, of which var. *Hartii* (Dewey) Gray, and var. *Macounii* (Dewey) Fernald, are the best marked, being described. In both these varieties the spikes are scattered and mostly long-peduncled. In typical *C. retrorsa* they are mostly clustered and sessile at the tips of the culms, 1.7 to 2 cm. thick, the perigynia 8 to 10 mm. long. A plant collected by Dr. B. L. Robinson at the Rangeley Lakes differs so markedly in its small perigynia and slender spikes that it may be distinguished as

C. RETRORSA, var. **Robinsonii**, n. var. Spikes mostly crowded and sessile at the top of the culm, slender, 1.2 to 1.5 cm. thick: perigynia 5 to 6 mm. long.— MAINE, gravelly shore, Middle Dam, Rangeley

Lakes, August 2, 1903 (*B. L. Robinson*). Similar specimens have been collected by Mr. F. F. Forbes on the Matane River, Quebec.

Carex bullata Schkuhr, Reidgr. Nachtr. 85, t. U u u, fig. 166 (1806) was described with "spicis....femineis binis cylindraceis"; and in the figure two inflorescences are shown with three spikes varying form 2.85 to 3.3 cm. long, and from 1 to 1.2 cm. thick, i. e. definitely cylindric. In recent years, however, the name *C. bullata* has been applied to a plant with the spikes subglobose or thick-cylindric, an extreme of the species generally more common than the plant with narrowly cylindric spikes; while the plant with more slender spikes has been variously treated as a species, *C. Olneyi* Boott, as a hybrid between *C. bullata* and *C. utriculata*, and as an extreme variety of *C. bullata*. Comparison with Schkuhr's original description and figure shows, however, that *C. Olneyi* is the plant which he had in hand, and we must, therefore, treat the two extreme variations as follows.

C. bullata Schkuhr. Pistillate spikes 1 or 2, cylindric, 2.5 to 5 cm. long, 1 to 1.5 cm. thick: perigynia dull or slightly lustrous.— Riedgr. Nachtr. 85, t. U u u, fig. 166 (1806). *C. Olneyi* Boott, Ill. i. 15, t. 42 (1858). *C. bullata* × *utriculata* Bailey, Proc. Am. Acad. xxii. 68 (1887). *C. monile* Britton, Bull. Torr. Bot. Club, xxii. 221 (1895), not Tuck. *C. bullata*, var. *Olneyi* Fernald, Rhodora, iii. 52 (1901).

Var. **Greenii** (Boeckl.), n. comb. Spikes globose to thick-cylindric, 1 to 4 cm. long, 1.5 to 2 cm. thick: perigynia lustrous.— *C. Greenii* Boeckl. Flora, xli. 649 (1858). *C. bullata*, Am. Authors.

Gray Herbarium.

FILIPENDULA RUBRA, A NEW BINOMIAL.

B. L. Robinson.

Few of the native plants of the Middle West exceed in beauty the "Queen of the Prairie," with its pinnate leaves, palmately lobed leaflets, and numerous gracefully panicled flowers, which according to the apt description of Dr. Gray are "deep peach-blossom color." The species has been extensively cultivated both within and east of its natural range, and has now become established as an escape from gardens in some parts of Vermont and Connecticut, perhaps elsewhere

in New England. As it is now a member of the flora of our region and must be included in various local lists, the question of its correct scientific name is likely to arise, and it may be in place to say a few words on this point.

From a general habital resemblance to *Spiraea,* the species and some of its European allies were long referred to that genus. Maximowicz, however, after long and critical study of the group, expressed with great definiteness the view that the genus *Filipendula* bore no close affinity to *Spiraea,* but was rather to be placed near *Geum,* his statement being as follows:

"Genus hucusque inter *Spiraeas* receptum certe ab illis omnibusque *Spiraeaceis* abhorret achaeniis indehiscentibus caducis 1-spermis, stigmate amplo et staminibus post anthesin deciduis filamento sub anthera subincrassato neque attenuato. Inter *Rosaceas* igitur ponendum, ubi modo crescendi, foliis, stipulis, fragrantia qualitateque rhizomatum, nec non inflorescentia (etsi multo divitiore ramisque adventitiis aucta) cum *Geo* et affinibus ubi in nonnullis etiam iteratim trichotoma flore centrali breviore occurrit, bene convenire videtur."[1]

For the genus, thus separated from *Spiraea,* Maximowicz takes up *Filipendula,* a name dating from the sixteenth century. Maximowicz attributes the name to Linnaeus, however, and cites his Genera ed. 1, p. 145 and Species Plantarum ed. 4, p. 172. It is clear that the latter reference is merely a clerical error for Linnaeus's Genera, ed. 4, p. 172. Both of these editions of the Genera appeared before 1753, the date now generally adopted as the starting point for modern botanical nomenclature, and the plants in question were later referred by Linnaeus in the several editions of his Species and Systema to *Spiraea.* The first use of *Filipendula* subsequent to 1753 is by Adanson,[2] whose description, although brief, is accompanied by definite references to the works of Tournefort and Linnaeus in such a manner as to leave no doubt as to its precise application. It is to Adanson, therefore, that the genus as a part of modern nomenclature should be ascribed.

Although Maximowicz selected the earliest generic name, he unfortunately adopted the specific name *lobata* from *Spiraea lobata* Gronov., having apparently overlooked the earlier specific name *rubra,* employed by Hill under *Ulmaria.* The Vienna rules of nomenclature require the union of the oldest specific and generic names, as follows:—

[1] Act. Hort. Petrop. vi. 246 (1879).

[2] Families des Plantes, ii. 295 (1763).

Filipendula rubra (Hill), n. comb.

Ulmaria rubra Hill, Hort. Kew. ed. 1, 214 (1768).

Spiraea lobata Gronov. ex Jacq. Hort. Vindob. i. 38, t. 88 (1770).

Spiraea palmata L. Syst. ed. 13, p. 393 (1774).

Ulmaria lobata Kostel. Ind. Prag. (1844) ex Maxim. Act. Hort. Petrop. iv. 251 (1879).

Filipendula lobata Maxim. Act. Hort. Petrop. vi. 251 (1879).

The only question which seems likely to arise in regard to this disposition of our species, is whether the old genus *Ulmaria* should be treated as generically separable from *Filipendula*, but for this there seems no rational ground. Historically the two genera rest upon the European *Spiraea Filipendula* and *S. Ulmaria* respectively. These species, familiar in cultivation, exhibit an inflorescence of identical plan and flowers without sufficiently important differences to suggest even subgeneric or sectional distinctions to the more critical writers who have occupied themselves with the group. It is true that the small very numerous leaflets in the type of *Filipendula* and their pinnatifid contour give the plant a rather characteristic appearance markedly different from the type of *Ulmaria*, but when the Asian species with leaflets of intermediate number, size, and form are taken into account, it will be seen that these foliar differences are by no means distinctions of constancy or moment. It is to be noticed, also, that there is a general consensus among scholarly students of the *Rosaceae* that these genera should be united; see for example, Maximowicz, l. c., Focke in Engl. & Prantl, Nat. Pflanzenf. iii. Ab. 3, 40 (1888) & Nactr. 187 (1897), Rehder in Bailey, Cycl. Hort. 1878 (1902), Aschers. & Graebn. Syn. mitteleur. Fl. vi. 436 (1902), etc.

Gray Herbarium.

Vol. 8, no. 93, including pages 169 to 188 was issued 8 October, 1906.

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Vol. 8. November, 1906. No. 95.

NOTES ON GRASSES.

A. S. HITCHCOCK.

DURING the study of the grasses of the northeastern United States it has been found necessary to describe a few new species and varieties, and to change the names of other forms to agree with the recent International Rules of Botanical Nomenclature. Some new combinations are due to changes in the rank of groups, investigation having shown that forms supposed to be varieties must be recognized as species, or the reverse. The new names and descriptions are given below.

Andropogon scoparius var. **littoralis** (Nash), comb. nov.

A. littoralis Nash, 1901. Britt. Man. 69.

Sand dunes along the coast, N. Y. and southward.

Paspalum psammophilum Nash MSS.

P. prostratum Nash, 1901. Britt. Man. 74, not Scribn. & Merr. Jan. 1901; earlier than Britton's Manual.

Sandy soil, So. N. Y. to Del.

Paspalum laeve var. **australe** Nash MSS.

P. australe Nash, 1901. Britt. Man. 1039.

Va. to Fla. and Miss.

Axonopus furcatus (Flügge), comb. nov.

Paspalus furcatus Flügge 1810. Mon. Pasp. 114.

Paspalum Elliottii Wats. 1890. Gray, Man. Ed. 6, 629.

Panicum gravius Hitchc. & Chase, sp. nov.

Culms in large tufts, slender, 50–80 cm. high, erect or spreading at the summit, sheaths glabrous except a puberulent ring at the summit, the lower usually softly pubescent; ligule a ring of hairs 0.3 mm. long; blades spreading, 6–10 cm. long, 6–10 mm. wide, (the lower shorter), acuminate, rounded at the base, glabrous, the lower rarely

puberulent; panicle long, exserted, 6–11 cm. long, as wide or wider, the slender flexuous branches fascicled, the lower spreading or drooping at maturity, spikelet-bearing at the ends; spikelets oval, 2 mm. long, glabrous, first glume $\frac{1}{4}$–$\frac{1}{3}$ as long as the spikelet, acute, 1-nerved, second glume and sterile lemma 5–7 nerved, equal, covering the fruit at maturity; fruit elliptic, 1×1.8 mm., obscurely apiculate. Autumnal state diffusely branched, forming very large top-heavy reclining bunches, the slender branches recurved, the numerous flat blades horizontally spreading.

In the simple state this species resembles large specimens of *P. dichotomum* L., to which it is most nearly allied, but it is distinguished in that state by wider blades, larger panicle with more drooping branches and by equal second glume and sterile lemma (rather more strongly nerved than in *P. dichotomum*), which cover the fruit at maturity. In *P. dichotomum* the second glume is shorter and exposes the fruit. In autumnal state *P. gravius* is readily distinguished by the habit.

Rocky or dry woods and hillsides, Connecticut to Michigan, south to Georgia, Mississippi and Arkansas.

Type *Chase 3620*; forming top-heavy tufts, in sandy, rather dry woods, on the old Commons farm, between Centreville and Mt. Cuba, Delaware, July 30, 1906; collected by Agnes Chase. Deposited in National Herbarium.

Distribution: Connecticut: Meriden, *Bissell* 5579. Michigan: Port Huron, *Dodge* in 1899; Michigan Agricultural College, *Wheeler* in 1900. Pennsylvania: Easton, *Porter* in 1895. Delaware: Mt. Cuba, *Commons 296*, *Chase 3620*. Maryland: Riverdale, *Chase 3643*. District of Columbia: Washington, *Hitchcock 18* and *257*. Virginia: Marion, *Small* in 1892. North Carolina: Biltmore, *Biltmore Herb. 800a*. Georgia: Stone Mountain, *Hitchcock 183*. Missouri: Monteer, *Bush 2877*. Arkansas: Fulton, *Bush 2532*. Mississippi: Saratoga, *Tracy 8403*.

Panicum praecocius Hitchc. & Chase, sp. nov.

Culms tufted, 15 to 25 cm. high in the simple state, early branching and elongating, sometimes to 30–45 cm., at first erect, soon becoming geniculate and spreading, very slender, wiry, abundantly pilose with weak spreading hairs 3–4 mm. long; sheaths, even the lowest, much shorter than the very long internodes, those of the branches usually but 1–2 cm. long, pilose like the culm, more prominently papillose; blades rather firm, erect or ascending, 5–8 cm. long, 4–6 mm. wide, those of the branches as large as the primary leaves, linear-oblong, often somewhat involute toward the acuminate apex, scarcely nar-

rowed toward the base, long-pilose on both surfaces, the hairs of the upper surface 4–5 mm. long, erect from the plane of the blade; ligule 3–4 mm. long; primary panicles at first usually overtopped by the upper leaf, but at or past maturity exserted, ovate or rhombic in outline, 4–6 cm. long, nearly as wide, loosely flowered, the axis pilose, branches flexuous, spreading or ascending; the secondary panicles smaller, numerous, overtopped by the leaves; spikelets 1×1.8–1.9 mm., obovate and turgid at maturity, obtuse, pilose with weak spreading hairs, first glume $\frac{1}{3}$–$\frac{1}{2}$ the length of the spikelet, triangular, 1-nerved; second and third subequal, 7-nerved, the second slightly shorter than the fruit at maturity; fruit 1×1.6 mm., broad-elliptic. Winter leaves lanceolate, long pilose.

This species scarcely has a simple state, the branches appearing often before the first panicle is expanded. Distinguished from *P. lanuginosum* by the early branching, the usually shorter culms, the firmer, narrow, long-pilose blades, the smaller, fewer-flowered panicles, and more turgid, longer-pilose spikelets.

Dry prairies and clearings, Michigan to Oklahoma and Texas.

Type *V. H. Chase 649*; dry bank, near Wady Petra, Stark County, Illinois, June 30, 1900, collected by Virginius H. Chase.

Distribution: MICHIGAN: Michigan Agricultural College, *Wheeler 18* in 1900. WISCONSIN: Lauderdale, *R. Bebb 1000*. ILLINOIS: Joliet, *Skeels 252*; Wady Petra, *V. H. Chase, 472* and *649*. MISSOURI: Howell County, *Bush 54*; Monteer, *Bush 743* and *748*. KANSAS: Manhattan, *Kellerman 20*; *Carleton* in 1892. OKLAHOMA TERRITORY: Stillwater, *Hitchcock* in 1903. TEXAS: Waller County, *Thurow 5* in 1898.

Panicum lanuginosum var. **siccanum** Hitchc. & Chase, var. nov.

Plants smaller than typical *P. lanuginosum*, of similar habit, the culms appressed-pilose, the sheaths less stiffly pilose than in the species, blades usually somewhat firmer, the upper surface glabrous or with a few scattered long hairs, mostly near the base, lower surface pubescent; ligule shorter (1 mm. long); panicle more open, fewer-flowered, usually smaller; spikelets 1×1.7 mm., more rounded and turgid than those of the species, the pubescence shorter. Much like smoother forms of the species and distinguished only by the characters given.

Dry sand, Massachusetts to North Carolina, west to Kansas.

Type *Chase 1602*, Dry, hot sand of sandstone cliff, Starved Rock, Ill.

Distribution: MASSACHUSETTS: West Quincy, *Churchill* in 1891; Wellesley, *Smith 735*. CONNECTICUT: Montville, *Graves 328*; Lyme,

Graves 329. ONTARIO: Gault, *Herriot 61.* INDIANA: Miller, *Chase 1552.* WISCONSIN: Trempleau, *Pammel* in 1887. ILLINOIS: Starved Rock, *Chase 1602, 1603* and *1604.* KANSAS: Manhattan, *Kellerman* in 1888. PENNSYLVANIA: Germantown, *Stone 13.* DISTRICT OF COLUMBIA: Zoological Park, *Pollard 523.* NORTH CAROLINA: Biltmore, *Biltmore Herbarium 698b.*

Panicum lanuginosum var. **huachucae** (Ashe), comb. nov.

P. huachucae Ashe 1898. Journ. Elisha Mitch. Soc. **15**: 51.

Me. to Minn. and southward.

Panicum oricola Hitchc. & Chase, sp. nov.

Plants grayish, often purplish; culms densely tufted, 10–30 cm. long, spreading, soon becoming branched and prostrate, densely appressed or ascending pilose, the hairs on the nodes spreading; sheaths usually more than half the length of the internodes, overlapping on the branches appressed-pilose; blades firm, erect or ascending, 2–5 cm. long, 2–4 mm. wide, broadest near the base, acuminate; upper surface pilose with hairs 3–5 mm. long, sparse on the later leaves; lower surface appressed-pubescent mixed with longer hairs; ligule a dense ring of hairs 1–1.5 mm. long; primary panicle short exserted, or rarely long-exserted early in the season, ovate in outline, 1.8–3 cm. long, rarely longer, 1–2 cm. wide, rather densely flowered, the axis appressed-pubescent, branches fascicled, flexuous, ascending or spreading; spikelets 1×1.5 mm. broadly obovate, obtuse, pubescent with short spreading hairs, first glume ⅓ to ½ the length of the spikelet, abruptly pointed, strongly 1-nerved, second and third equal and just equaling the fruit at maturity, obtuse, 7–9 nerved; fruit 0.9×1.3 mm., broadly elliptic, very turgid, obscurely pointed. In autumnal state the plants are prostrate, forming mats, with short fascicled branches at all the nodes; leaves and panicles not greatly reduced, the latter overtopped by the leaves, which are less pilose than are the earlier ones; winter leaves lanceolate, sparsely pilose above.

Distinguished by the decumbent or prostrate habit, appressed-pilose culms and sheaths, and the small panicles of rounded spikelets, large in proportion to the size of the panicle.

Sand barrens along the coast, Massachusetts to Virginia.

Type *Hitchcock 47* in National Herbarium. Prostrate clumps on bare sand on low mounds between marsh and sand dune. Lewes, Del. June 18, 1905, collected by A. S. Hitchcock.

Distribution: MASSACHUSETTS: Nantucket, *Hitchcock* in 1902. NEW YORK: Long Island, *Young* in 1871. NEW JERSEY: Absecum, *Commons 45*; The Plains, *Stone* in 1901. DELAWARE: Lewes, *Hitchcock 47*; Rehoboth, *Commons 59.* VIRGINIA: Cape Henry, *Hitchcock 64*; *Chase 2339.*

Panicum unciphyllum var. **thinium** Hitchc. & Chase, var. nov.

Differs from *P. unciphyllum* as follows: Culms shorter, not over 30 cm. high, in larger tufts, pubescence denser and longer; early becoming profusely branched and widely spreading, the small erect blades with scattered long stiff hairs on the upper surface; spikelets slightly smaller, 1.3–1.4 mm. long, very turgid, obtuse.

Dry sands, New Jersey.

Type *Chase 3577* in National Herbarium. In mats, sandy, open ground, Tom's River, N. J. July 28, 1906; collected by Agnes Chase.

Distribution: Atsion, *Chase 3562*; Tom's River, *3576* and *3577*; Forked River, *3581*.

This form seems to be included in the description of *P. psammophilum* Nash (Bull. Torr. Bot. Cl. **26**: 576. Nov. 1899, not Welw. July, 1899) but the type, *Clute 175* in N. Y. B. G. herbarium, is *P. unciphyllum* Trin. (*P. columbianum* Scribn.)

P. patulum (Scribn. & Merr.), comb. nov.

P. Nashianum patulum Scribn. & Merr. 1900. U. S. D. A. Div. Agrost. Circ. **27**: 9.

S. E. Va. to Fla., near the coast.

Panicum aculeatum Hitchc. & Chase, sp. nov.

In very large clumps, culms slender, 0.7–1 m. high, ascending, scabrous, harshly pubescent below; sheaths papillose-hispid with stiff sharp-pointed hairs, a puberulent ring at the summit, uppermost usually glabrous; ligule minute, membranaceous, ciliate; blades firm, stiffly ascending or spreading, 12–20 cm. long, linear-lanceolate, acuminate, involute-pointed, very scabrous on the upper surface and toward the apex beneath, paler on the under surface; panicle rhombic in outline, 8–12 cm. long, about as wide, few-flowered, the slender, flexuous, fascicled branches ascending or spreading, naked at the base, scabrous, sometimes with a few viscid spots; spikelets 3 mm. long, elliptical, minutely pubescent, first glume $\frac{1}{4}$ to $\frac{1}{3}$ as long as the spikelet, 1-nerved, acute, second glume and sterile lemma 9–11 nerved, abruptly acute, slightly exceeding the fruit; fruit elliptic, 1.3×2.7 mm., minutely umbonate. Autumnal state, branching from the middle nodes, the branches more or less divaricate, not much crowded.

Allied to *P. scabriusculum* Ell.; panicle smaller, more open, fewer-flowered, axis and branches scarcely viscid, spikelets larger, the glumes only slightly exceeding the fruit.

Type *Chase 2520* in National Herbarium. In large clump by small slough, border of woods, Takoma Park, D. C., July 27, 1904; collected by Agnes Chase.

Distribution: District of Columbia: Takoma Park, *Chase* 2520;

Hitchcock & Chase 94; *House* 1041. NORTH CAROLINA: Lake Mattamuskeet, Chase 3210.

The name refers to the aculeate hairs on the lower sheaths.

Setaria imberbis var. **perennis** (Hall), comb. nov.

S. perennis Hall. 1893. Trans. Kan. Acad. Sci. **13**: 102.

Chaetochloa versicolor Bickn.

Brackish marshes along the coast, Ct. to Fla. and in saline soil, Kan. and Ind. Terr.

S. viridis var. **breviseta** (Doell.), comb. nov.

Panicum viride brevisetum Doell, 1857. Bad. Fl. **1**: 234.

A form with bristles scarcely longer than the spikelets; Maine, *Fernald.*

Zizania aquatica var. **angustifolia**, var. nov.

Culms about 1 m. high, leaves narrower than in the species (less than 1 cm. wide), pistilate portion of panicle appressed.— Me. to Minn. and northw. Type from Belgrade, Me., *Scribner*, Aug. 1895.

Oryzopsis racemosa (J. E. Smith) Ricker MSS. comb. nov.

Milium racemosum J. E. Smith, 1813. Rees, Encycl. 23: 15.

Oryzopsis melanocarpum Muhl. 1817. Gram. 79.

Rocky woods, Ont. and Vt. to Minn. southw. to Del. and Ia.

Calamagrostis Pickeringii var. **lacustris** (Kearney), comb. nov.

C. breviseta lacustris Kearney, 1898. U. S. D. A. Div. Agrost. Bul. **11**: 25.

Moist ground, Mts. of N. Eng. and along the Great Lakes to Minn.

Spartina patens var. **juncea** (Michx.), comb. nov.

Trachynotia juncea Michx. 1803. Fl. Bor. Am. **1**: 64.

Spartina juncea Willd. 1809. Enum. 81.

Salt marshes and sandy beaches along the coast, N. H. to Fla. and Tex.

Spartina patens var. **caespitosa** (A. A. Eaton), comb. nov.

S. caespitosa A. A. Eaton, 1898. Bul. Torr. Bot. Cl. **25**: 338.

Borders of brackish marshes, N. H. and Mass.

Ctenium aromaticum (Walt.), comb. nov.

Aegilops aromatica Walt. 788. Fl. Car. 225.

Ctenium americanum Spreng. 1825. Syst. **1**: 274.

Wet pine barrens, Va. and southw.

Tridens flava (L.), comb. nov.

Poa flava L. 1753. Sp. Pl. 68.

Triodea seslerioides (Michx.) Benth. 1883. Vasey, Cat. Grass. U. S. 35.

Triodea cuprea Jacq. 1813. Eclog. Gram. 21.

Dry or sandy fields, Ct. to Mo. and southw.

Melica striata (Michx.), comb. nov.

Avena striata Michx. 1803. Fl. Bor. Am. **1**: 73.

Rocky wooded hills, Gaspé to Pa., Minn., and westw.

Glyceria Torreyana (Spreng.), comb. nov.

Poa Torreyana Spreng. 1821. N. Entd. **2**: 104.

Glyceria elongata (Torr.) Trin. 1836. Gram. Suppl. 58.

Poa elongata Torr. 1821. Spreng. N. Entd. **2**: 104, as syn. under *P. Torreyana.*

Glyceria pallida var. **Fernaldii,** var. nov.

Culms very slender, usually geniculate and spreading, 2–4 dm. high, leaves 4–8 cm. long, 2–3 mm. wide, panicles 5–7 cm. long, the fascicled branches lax, flexuous; spikelets 3–5 flowered, 4–5 mm. long; glumes and lemmas obtuse, usually erose at the summit. Flowering later than the species.

Wet places, Me. to Minn.

Type Aroostook Co., Me., *Fernald 191.*

Glyceria septentrionalis, sp. nov.

Culms erect, 1–1.5 m. high, thick and soft; sheaths overlapping, loose, smooth, the upper closed nearly to the summit, ligule 5–6 mm. long, decurrent; blades 1.2–2.5 cm. long, 6–8 mm. wide, nearly smooth, rather obtuse; panicle 2–2.5 dm. long, the subflexuous branches ascending, a spikelet subsessile in each axil; spikelets 8–12-flowered, 1.5–2 cm. long, subsessile or on short pedicels; glumes obtuse, scarious and shining; lemmas 4–4.5 mm. long, faintly 7-nerved, hispidulous, with a shining scarious summit, erose-obtuse, slightly exceeded by the tip of the palea.— In shallow water, N. Eng. to Va. and westw.

Type collected at Guttenberg, N. J. by Wm. M. Van Sickle.

Intermediate between *G. fluitans* (L.) R. Br. and *G. borealis* (Nash) Batchelder, but usually stouter and broader-leaved than either. This has passed as *G. fluitans* (L.) R. Br. but has smaller spikelets and shorter lemmas, and the lemma is hispidulous instead of minutely scabrous. *G. fluitans* occurs along the Gulf of St. Lawrence (Fernald) and near New York City (Nash). Mr. Nash named this form *Panicularia brachyphylla*, noting the difference between that and the common form, but it is identical with *Glyceria fluitans* of Europe.

Bromus latiglumis (Scribn.), comb. nov.

B. ciliatus latiglumis Scribn. 1900. Shear, U. S. Dep. Agric. Div. Agrost. Bul. **23**: 40 as syn. under the next.

B. purgans latiglumis Shear. 1900. l. c.

Wooded hills, Pa. to Mont. and Mo.

Bromus incanus (Shear), comb. nov.

B. purgans incanus Shear. 1900. l. c. p. 41.

Wooded hills, Pa. to Va., S. D. and Tex.

Elymus striatus var. **arkansanus** (Scribn. & Ball), comb. nov.

E arkansanus Scribn. & Ball. 1900. U. S. Dep. Agric. Div. Agrost.
Bul. **24**: 45.

Wooded hills, Md. to Ia. and southw.

Department of Agriculture, Washington, D. C.

SOME MAINE RUBI. THE BLACKBERRIES OF THE KENNEBUNKS AND WELLS,— III.

W. H. Blanchard.

In this concluding paper the *Hispidus* and *Setosus* classes of blackberries are taken up, two new species and one new variety are described, and some of their variations are mentioned under names suggested by the now popular explanations of plant variations.

Rubus hispidus L. (*R. sempervirens* Bigelow, *R. obovalis* Michx. *R. obovatus* Persoon.) Plants normally perfectly prostrate; stems very slender, small at the base, beset with few to very numerous slender mostly reflexed bristles, some of the smaller generally tipped with small glands; branching freely and tipping vigorously. Leaves on new canes 3-foliate or often in this section 5-foliate, thick, smooth, shining, remaining in favorable places till spring, stipules often large; leaflets broadly obovate with a very short point or none, 1 to 1½ in. long, often 2 in., crenate-dentate, variants often serrate and pointed. Growth on old canes erect, leafy, nearly glabrous; leaves 3-foliate, probably never normally 5-foliate; leaflets thick, broad and rounded; inflorescence slender, more or less racemose; bristles very weak or none, unifoliate leaves few and broad; flowers very variable in size, ⅝ in. to 1 in. broad or sometimes very large; petals generally broad, often very narrow; blossoming and fruiting very late; fruit generally small and sour, but in favorable places often ⅜ in. in diameter and quite edible. Abundant in all parts of this section, dry or moist ground, shade or sun.

The popular impression seems to be that this is a very weak plant

and the herbaria collections mostly are such, but it is often of a very robust nature especially in elevated situations and on bleak shores. These forms seem to make it desirable to have them segregated as a variety.

Var. **major,** n. var. Plants much larger in every way, the stem often densely covered with rather strong bristles, leaves much larger, leaflets on new canes often 3 in. long, frequently pointed and serrate, sometimes narrow; varying in a similar manner on the old canes. Tendency to climb over bushes much greater.

Rubus setosus Bigelow. (*R. nigricans,* Rydberg.) Plants with the *new canes* generally erect, sometimes decumbent, 1½ to 3 ft. high or often 4 ft.; stems seldom branched, terete or slightly angled, thick at the base and soft, clothed with numerous bristles varying from 200 soft ones to 100 or less strong ones to the inch of stem, the former set at a right angle to the stem and the latter strongly retrorse, more or less of the smaller bristles and hairs bearing small glands at the end. Leaves often large, 4 in. wide, varying from light yellow-green to dark green, not thick but firm, nearly or quite glabrous, a few appressed hairs above and some close pubescence below not rare, mostly 5-foliate, a few of the lower leaves 3-foliate; leaflets oval or rhomboidal, rather cuneate and well pointed; serrate, or serrate-dentate toward the points, the middle one about 3 in. long and 1¾ in. wide, the others similar in shape but smaller; petiole and petiolules resembling the stem in bristles and glands, the petiolule of the middle leaflet ¾ of an inch long, the side ones shorter and the basal leaflets sessile.

Old canes often decumbent or prostrate, badly killed back especially on large canes, bristles generally much impaired. Second year's growth consisting of leafy erect or upward spreading fruit branches tipped with a racemose often branched inflorescence; branches very variable in length, generally one from each old leaf-axil or several from the upper if badly killed back. Axis seldom straight, weakly armed or merely hispid; leaves 3-foliate or part of them 5-foliate; leaflets pointed at each end, varying from narrow to wide, serrate-dentate; in texture and color much like those on new canes. Unifoliate leaves few none or rarely many. Pedicels and calyx lobes generally hispid often densely so with abundant glanded hairs, or sometimes nearly naked. Flowers appearing very late rather showy, 1 in. broad more or less, petals usually narrow, less than one-half as wide as long. Fruit ripening late globose, small and sour, or often quite large and edible.

Grows everywhere in these towns, the rankest plants in the richest and most favored spots. Farther south and in less exposed places it seems to be most at home in moist situations.

Dr. Rydberg's *R. nigricans* is a synonym for this species and the injection of this name has tended to make confusion. There are

extant three very meagre specimens sent out by Dr. Bigelow evidently taken from the same plant which he says grew in a swamp in Sudbury, Mass. Dr. Rydberg assumes that these three specimens belong to a species distinct from the great mass of what is known as *R. setosus* which he by this process makes nameless and proceeds to name. The writer in August, 1906, gathered this species from about a dozen stations in Sudbury each different from the others and varying as much or more from each other as they do from Dr. Bigelow's. This species is variable but the variations are not deep. If these slight variations are to be considered as specific there is no end to the species that can be made from them. His specimens and his description will probably satisfy botanists, acquainted with this species in its haunts, that this plant may properly still be known as *R. setosus* Bigelow.

Rubus tardatus, n. sp. Plants slightly glandular, very late in starting and fruiting, decumbent, seldom branched tending to be prostrate and entirely so the second year, tipping vigorously; stems terete, hard, with numerous strong bristle-prickles; leaves quinate, leaflets narrow, dark green, thick, smooth and somewhat leathery. Some of the leaves on the fruit branches often quinate.

New canes. Stems decumbent, tending to be prostrate, seldom branched, brown, hard, 3 to 6 ft. long, tipping vigorously in September; pith slightly pentagonal; proper pubescence on the stem none, a few or numerous red-glanded hairs, commonly present. Prickles varying from spiny ones to strong bristles, ⅛ in. long, 25 to 30 to the inch of stem, set at random. Leaves large, 5-foliate, large ones 7 in. long by 6 in. wide, thick, leathery, very dark green and perfectly glabrous on the upper surface, pubescence close on the lower surface or wanting, not appreciable to the touch. Leaflets long oval to obovate, outline entire, narrowly cuneate and rather long-pointed, entire at the base, serrate then serrate-dentate above. Petiole and petiolules slender, yellowish, glabrous save a few glanded hairs, well grooved, prickles long, slender, straight; the petiolule of the middle leaflet ½ in. long, the side ones short, and the basal leaflets sessile.

Old canes. Stems prostrate, slightly killed back, prickles somewhat broken. Growth of second year consisting of erect leafy branches or stemlets, 7 in. to 1 foot high, one from each old leaf-axil. Axis nearly straight, glabrous, prickles few and weak. Leaves in color and texture like those on new canes, 3-foliate or often the lower 5-foliate the upper unifoliate; leaflets often 2 in. long, generally narrow, long-cuneate, pointed, singly serrate, the middle one short-stalked. Inflorescence occupying about one-fourth of the axis a simple raceme, 8 to 12 flowers, subtended by small bracts and unifoliate leaves, pedicels and peduncle with numerous glanded hairs. Flowers, appearing first about the 10th of July, about one inch broad, petals one-half as

wide as long, often more than five. Sepals glanded. Fruit globose of 3 to 21 drupelets, the best fruit about $\frac{1}{2}$ in. in diameter, rather sour.

Type stations: The west road from Kennebunk village to West Kennebunk, Maine. Abundant in Wells, Kennebunk and Kennebunkport. Also in North Berwick.

This species is a dewberry and has many of the characters of *R. hispidus* and *R. setosus* though they are not very apparent when casually examined. The texture and color of the leaves, thick and dark green, indicate the former; but they are not evergreen or shiny and are 5-foliate both on the new canes and often also on the old ones, narrow, serrate and pointed as in the latter. In many other respects the characters are similarly mixed, but the hard stem and stout prickles are to be found in neither.

Rubus junceus, n. sp. Plants with a flimsy look, erect the first year, weak, soft-stemmed, often prostrate the second year, glandless except on the inflorescence, prickles weak, leaves thin, 5-foliolate, flowering early.

New canes. Stems upright, thick at the base, weak, very soft, dark red, angled, 2 to 3 ft. high, rarely branched, glabrous and glandless, armed with straight, retrorse, slender bristle-prickles $\frac{1}{8}$ in. long, 10 to 20 to the inch of stem, not noticeably in lines. Leaves 5-foliate, flimsy-looking, thin light yellow-green, slightly hairy on the upper surface, considerably pubescent beneath. Leaflets oval, pointed at each end, coarsely, unevenly and doubly serrate-dentate, the middle leaflet broad, nearly rhombic, 3 in. long by 2 in. wide, the side ones similar but narrower and the basal ones quite narrow. Petiole and petiolules very slender, glabrous, grooved, retrorse bristles slender, the petiolule of the middle leaflet $\frac{3}{4}$ in. long, the side ones nearly one-half as long and the basal leaflets sessile.

Old canes. Stems often prostrate, prickles nearly intact or often all wanting. New growth consisting of erect leafy fruit branches 6 in. to 1 foot high, one from each old leaf-axil. Axis glabrous, unarmed, slightly zigzag. Lower leaves 3-foliate, none 5-foliate, resembling those on new canes, the upper ones unifoliate and becoming regularly smaller. Inflorescence occupying about one-fourth of the branch, racemose, covered with many red-glanded hairs, pedicels slender, about 12, subtended by the unifoliate leaves and leaflike bracts. Flowers appearing late in June about $1\frac{1}{8}$ in. broad, petals nearly twice as long as broad, sepals with numerous glanded hairs. Fruit ripe after the middle of August, mostly small, globose; one of the best $\frac{1}{2}$ in. in diameter with 14 drupelets each $\frac{3}{16}$ in. in diameter.

Type stations: Kennebunk depot yard; the direct road from the depot to the shoe-shop; the west road from Kennebunk village to Parsons station and the road to Wells Branch. Abundant in most parts of Kennebunk, Kennebunkport and Wells. Dry ground, open sun and light shade.

This very abundant species has some resemblance to *R. setosus*, enough perhaps to justify placing it in that class. Its red stem nearly naked the second year, flimsy delicate appearance, and early flowering easily distinguish it from that species.

There are in this section many other forms which may be considered as hybrids, mutants, variants or aberrant forms according to the botanist's way of looking at these subjects.

Rubus hispidus × setosus. These are mostly prostrate or nearly so but they do not like *R. hispidus* branch, tip, nor preserve their leaves through the winter, while they are 5-foliate. Frequent. No two alike.

Rubus hispidus × semierectus. Rare, found in but two or three places.

Rubus hispidus × biformispinus. This was found in but one place and both the species were growing near.

Several other very distinct forms grow here. One is a dwarf "high" blackberry 1 to 2 feet high, remarkably fruitful, growing in the woods. Another belongs to the *Setosus* class, while a third though common fruits so little as to give little chance to study it. Should they prove to be abundant and widespread names will be in order. What the writer regards as the essentials of a species is not merely distinct characters, but the form must be sufficiently abundant and widespread. Sports frequently have sharper characters than any species.

Supplementary Notes on the Three Preceding Papers.

During the present season the writer has done a good deal of work on Rubus in Rhode Island and in Massachusetts especially in the southeastern part. As some of the plants described in these papers as new species have been found in additional localities, it seems worth while to append the following notes in regard to them: — *Rubus Arundelanus* is abundant on the highway from Marblehead to Swampscott. *R. recurvicaulis* is also abundant in hedges in the neighborhood "Cow Fort" in Marblehead. *R. geophilus* occurs in the northern part of New Bedford and in Plymouth near Manomet. *R. plicatifolius* was found in Burrillville, R. I., and in Palmer and Munson, Mass. *R. arenicolus* was very plenty in pastures in Stoughton and several miles away in Canton. *R. semierectus* occurred abundantly by the road from Westvale in Concord to the Wayside Inn in Sudbury, and in Arlington near the standpipe. *R. Arundelanus* and

R. Jeckylanus belong to the *Frondosus* class. *R. frondosus* seems to deserve notice here.

Rubus frondosus Bigelow. This fine species, which was described eighty years ago and which is very abundant about Boston, seems never to have been recognized and there are few herbarium specimens extant. One is a short undeveloped fruit branch in bud sent by Dr. Bigelow to Dr. Torrey in 1823. In the letter accompanying it he characterized it much as in his description published soon after in the second edition of his "Florula Bostoniensis." This letter is preserved at the New York Botanical Garden. A second specimen is a fruit branch in flower collected recently by Mr. W. P. Rich. A third is also a flowering branch collected recently on the Arboretum grounds at Jamaica Plain. These two are preserved in the Arboretum herbarium. The writer had assumed that the Boston botanists had secured the common plants in that section and not till late in August (1906) did he look around there. The species in question was soon found at Cobb Corner in Sharon and near Sharon Heights. Afterwards it was observed at the following stations: Canton, Arlington, Lexington, Medford, Winchester, Stoneham, Belmont, Sudbury, Framingham, Wayland, Clinton, and Milton. It is especially abundant on the hill between Arlington village and Lake Mystic, and in Clinton two miles south of the Wachusett dam in the pastures bordering the east side of the reservoir near the Electric Railroad. It is to be distinguished at sight from the other "high bush" blackberries by its strong, round stem, abundant long recurving branches which touch and lie upon the ground but do not appear to tip, leaves thick, roughly pubescent, leaflets very broad, the middle one only stalked. The old cane preserves its leaves till autumn the fruit ripening early and falling while all the leaves even on the inflorescence remain. The inflorescence is a close cyme with many of the pedicels subtended by broad leaves. No name could be more appropriate. It is occasional in Connecticut and Rhode Island.

Rubus Alleghaniensis Porter. (*R. nigrobaccus* Bailey, *R. villosus* Gray's Manual in part.) There are two very common, very characteristic and very different species of high blackberries in the eastern part of the United States. They constitute the bulk of the high blackberries from Maine to New York and south to North Carolina. They encroach very little on each other's territory. One is a northern plant with a delicious spicy flavor to be compared only with the straw-

berry, the plant that Dr. Porter named *R. Alleghaniensis* and Prof. Bailey later named *R. nigrobaccus.* Its range is from northern New England and New York (except at considerable elevations where *R. Canadensis* holds sway, *R. pergratus* in some places occurring also) to the low coast (beginning near Boston) and the adjacent valleys and sand plains. It extends to Northern New Jersey, occurs in spots in Southeastern Pennsylvania, and seems to be frequent in the Pocono Mountains.

The other which is a more southern plant has its northern limit at an elevation of about 200 feet in Connecticut and Rhode Island occupying about one-fourth of Connecticut and one-half of Rhode Island. It follows the coast and sand plains of Massachusetts to Boston. This is *R. Andrewsianus* described by the writer in Rhodora, Jan., 1906. As it occurs in Southington, Connecticut, it bears very poorly but nearer the coast and in Pennsylvania, New Jersey and Virginia it is an abundant bearer. The fruit is large, the drupelets loose and large. The fruit is sweet but not aromatic. Where the two species overlap this is much the earlier and seems to be the parent of most of the cultivated forms.

This information the writer has obtained by personal search, though an examination of several private herbaria and those of Brown University, Yale University, New York Botanical Garden, Philadelphia Academy of Sciences and the National Herbarium at Washington have confirmed it.

It appears that when Dr. Porter found *R. Alleghaniensis* it was so different from what he had called *R. villosus*—the plant now named *R. Andrewsianus* that he published it as a variety and later as a species. Note his description. "It differs from *R. villosus* in being less robust and tall but especially in the character of the fruit which is smaller, scarcely fleshy and possessed of a peculiar spicy flavor from $\frac{1}{3}$ to 1 in. or more in length and often oblong and tapering toward the end in the manner of the little finger." Prof. Bailey would hardly have published *R. nigrobaccus* if he had known the plant Dr. Porter called *R. villosus*. He hesitated, as it was, thinking Dr. Porter's name might be correct. There seems, however, to be no doubt that Dr. Porter was the first to segregate our spicy blackberry, and that its name should be *R. Alleghaniensis.*

Westminster, Vermont.

TWELVE ADDITIONS TO THE FLORA OF RHODE ISLAND.

M. L. Fernald.

While visiting in Providence during the latter part of September I had the pleasure of joining Miss Margaret H. Grant and Professor J. Franklin Collins on visits to the stations of some rare plants of Rhode Island. Though the object of the excursions was primarily to see certain species already known to botanists of the state, many other plants of interest were found, among them twelve species and varieties which a search of local lists and notes fails to show as recognized in the Rhode Island flora.

The first place visited was a patch of swampy woods near Nayatt station in the town of Barrington, where, in the lower areas *Woodwardia virginica* and *W. areolata* (*W. angustifolia*) and *Osmunda cinnamomea* were sufficiently abundant to be cited as characteristic plants, while in the open somewhat drier sandy spots *Rhexia virginica* and *Rynchospora glomerata* were conspicuous species. In this limited region the following plants apparently unrecorded from the state were found.

Aspidium simulatum Davenport. Abundant in wet woods with *Woodwardia areolata.*

Osmunda cinnamomea L., var. glandulosa Waters. Several large plants, among more numerous individuals of the typical glabrous form of the species, at the edge of the woods. It is interesting that at both the stations already recorded for this noteworthy variety,— Mr. Waters's original locality near Glen Burnie, in Anne Arundel county, Maryland[1] and Mr. Saunders's station near Clementon, New Jersey[2]—typical *O. cinnamomea* and the two Woodwardias were present, and at Mr. Waters's station *Aspidium simulatum* as well. All these plants occur in the wooded swamp in Barrington.[3]

Helianthus mollis Lam. Abundant in sandy soil by the roadside in one portion of the swamp. This very distinct Sunflower has

[1] C. E. Waters, Fern Bull. x. 21 (1902).

[2] C. F. Saunders, Fern Bull. xi. 52 (1903).

[3] Mr. W. N. Clute has recently summarized the two previous records of the habitat of *Osmunda cinnamomea*, var. *glandulosa* as "found in dryish situations" (Fern Bull. xiii. 119), although it is not easy to see how such a deduction can be made from the "low sphagnum woods" of Mr. Waters's account or the "low woods" of Mr. Saunders's record.

been found recently at various points along the northern sea-board,—in New Jersey, on Long Island, and in 1903 near Fall River, Massachusetts. At its only recorded New England station, in a field near Fall River, its discoverer, Mr. Sanford[1] considered the plant an introduction, derived from cotton waste. At Barrington, on the other hand, there is nothing except the proximity of a country-road to suggest the introduction of the plant, which is as apparently indigenous as the various ferns, the Rhexia, and other coastal plain plants of the region.

BIDENS DISCOIDEA (T. & G.) Britton. This distinctive plant of the coastal plain is probably common in Rhode Island as it is in adjacent Massachusetts and portions of Connecticut. It was found in the Barrington swamp, growing commonly on decaying logs and inundated fallen branches; and it was seen, though less abundantly, in a swamp near Lime Rock in the town of Lincoln.

The second region visited was in the town of Lincoln. Portions of this township are strongly calcareous, and at one point, Lime Rock, several lime quarries have been opened. Within the township we found many characteristic plants of calcareous soils which are already known from Rhode Island, but the following eight species, which it is the purpose here specially to note, are apparently additions to the flora of the state.

PANICUM MINUS Nash. Open gravelly soil in a railroad-cut.

JUNCUS DEBILIS Gray. In J. L. Bennett's "Plants of Rhode Island," this rush is listed as *J. acuminatus*, var. *debilis*; but, when preparing the Preliminary List of New England Juncaceae,[2] I was unable to verify the report, and saw the species only from Connecticut. *J. debilis* was found in great abundance with *J. Dudleyi*, *Parnassia caroliniana*, and other lime-loving plants at the border of a pond near one of the quarries at Lime Rock. The plants were very luxuriant, often 8 dm. high, with inflorescences 1.5 dm. long. But the most striking feature of the plants is the remarkable development of autumnal flowers, such as is known to me only in specimens collected by Ravenel in 1866 near Aiken, South Carolina. This plant of Ravenel's (Engelm. Herb. Junc. Norm., no. 61) Engelmann characterized as an autumnal form "in which the heads by

[1] S. N. F. Sanford, RHODORA, vi. 88 (1904).

[2] RHODORA, vi. 34–41 (1904).

renewed vegetation of their axis degenerate into spikes."[1] Normal *J. debilis* matures in early summer and has 2 to 7 flowers in a head. The late-flowering form at Lime Rock, like the Ravenel plant, has the heads mostly prolonged into many-flowered spikes, the longest 8 mm. long.

Polygonum cristatum Engelm. & Gray. Abundant on a gravelly bank, Lincoln. Formerly unknown east of Connecticut.

Agrimonia mollis (T. & G.) Britton. Found at various spots in Lincoln, in rocky (calcareous) open woods and thickets. Previously unknown east of Connecticut, where it is rare. The only herbarium-label which I find recording the lithological character of the habitat of *A. mollis* is one of Mr. A. A. Heller's, stating that in Lancaster County, Pennsylvania, the plant occurs in limestone, a soil-preference which it clearly follows in Rhode Island.

Amphicarpaea Pitcheri T. & G. Very abundant and climbing extensively to the height of eight or ten feet over shrubs, in alluvial woods, near a lime outcrop at Lime Rock. The vines form a close tangle covering perhaps an acre of ground, and when found were in abundant and very typical fruit. This plant, which is generally known from western New York to Missouri, Louisiana, and Texas, is very clearly a member of the New England flora. Twice before it has been reported,— from Winchester and Revere, Massachusetts, and from near Bridgeport, Connecticut; but in his discussion of the New England Leguminosae in 1900, Judge J. R. Churchill[2] was inclined to discredit the status of the species in New England. The Rhode Island plant is quite like material from the Mississippi Basin, the margins of the pods being covered with stiff mostly retrorse hairs.

Gerardia parvifolia Chapm. (*G. Skinneriana* of many authors, not Wood. *G. decemloba* Greene).[3] This beautiful coastal plain species is not cited from Rhode Island by Judge Churchill in his Preliminary List of New England *Scrophulariaceae*.[4] It occurs with other pine-

[1] Engelm., Trans. St. Louis Acad. Sci. ii. 466 (1868).

[2] Rhodora, ii. 91 (1900).

[3] The plant of sandy soils near the coast, from Massachusetts to Florida and Louisiana, should be called *G. parvifolia* Chapm., for it is clearly that species and not the plant described by Wood as *G. Skinneriana*, with which it has been confused. The latter species is a plant of the interior, from Ontario to Minnesota, Tennessee and Missouri, with the rose-colored corolla-lobes rounded or merely emarginate at tip and the capsule globose; while the coastal plant, *G. parvifolia*, has the lobes of the bright-pink corolla obcordate and the capsule oblong-ovoid.

[4] Rhodora, vii. 33–38 (1905).

barren plants on a sandy plain between Lime Rock and the Blackstone River.

Bidens vulgata Greene. Fully as common in the calcareous region as the ordinarily more abundant *B. frondosa*.

Bidens comosa (Gray) Wiegand. In limy soil, near "Dexter limerock." Already known locally in Massachusetts and Connecticut.

Gray Herbarium.

RECORDS OF THE CONNECTICUT BOTANICAL SOCIETY,— II.

E. B. Harger, Cor. Secr.

The Connecticut Botanical Society held three excursions during the summer of 1906.

The first excursion was to the trap and sandstone region of the valley of the Pomperang River, which is interesting as being a detached area of a few square miles of a geological formation otherwise found in this state only in the Connecticut River Valley. After leaving the station at Pomperang Valley about 9 a. m. the party first stopped at a field near by which was filled with *Pentstemon pallidus* Small., a species here quite different in aspect and habit from *P. hirsutus* (L.) Willd., which is found not far distant. At the next halt, near the Pomperang River, Messrs. Weatherby and Harger found *Galium verum* L. and *Parietaria Pennsylvanica* Muhl. The party then proceeded to the only known New England station for *Phlox pilosa* L. (see Rhodora **1**: 76), which was found to be in full bloom and apparently increasing. A quantity of *Convolvulus spithamaeus* L. was found near by. Most of the party then walked to the Housatonic River, returning from the station at Sandy Hook; but on account of the great heat and an impending shower little more collecting was done.

The second excursion, with Mr. H. S. Clark for guide, was to the Reservoir Parks, west of Hartford in the town of Farmington, and was held Aug. 22nd. Showers in the morning reduced the attendance but those who went saw, among other things, *Rosa setigera* Michx., *Aster infirmus* Michx. and *Solidago squarrosa* Muhl.; while

Mr. Bissell discovered *Eleocharis Engelmanni* Steud., and the writer, *Monarda fistulosa* L.

The third excursion on Sept. 12th was to the shore region near South Norwalk under the guidance of Mr. C. H. Bissell and Mr. G. P. Ells. At Roton Point Mr. Bissell showed the station for *Phaseolus perennis* L. noted in RHODORA **4**: 13 and, in the vicinity, *Baccharis halimifolia* L., *Arctostaphylos Uva-ursi* (L.) Spreng., *Setaria versicolor* Bickn. and *Elymus robustus* Scribn. & Sm. Here the proceedings were interrupted by a shower but the time was utilized by eating lunch under the shelter of a friendly veranda overlooking Long Island Sound and the Norwalk Islands. After the rain the party proceeded toward South Norwalk visiting the most northeasterly known station for the sweet-gum tree and stations for *Lophanthus nepetoides* (L.) Benth. and *Solidago rigida* L.

OXFORD, CONNECTICUT.

REGENERATION IN THE LEAF OF ARISTOLOCHIA SIPHO.— In RHODORA **5**: 38 (1903) I described the curious lamellar outgrowths on the under surface of a leaf of *Aristolochia Sipho*, first observed by Miss Katharine P. Loring, of Pride's Crossing, Massachusetts. The leaf was believed to have been injured and the lamellae were thought to be incidental to the healing of the wounds. Perrot discovered similar structures upon the same species in France.

Miss Loring has now placed the origin of the extraordinary growths beyond dispute by careful experiment. Early in the present season she selected a number of young leaves and treated them by folding and pinching the blades in various directions. Most of the injuries thus made were healed, and in connection with a good many the lamellae arose in accordance with expectation. Folds generally parallel with the principal veins were more successful in stimulating the desired growth than those made transversely to the veins. Some leaves were found which had numerous small areas of excrescence, the effect, as Miss Loring believed, of accidental abrasion, since these leaves were situated in surroundings favorable to such an explanation. At any rate, the experiment proves that the accessory lamellae may be occasioned by injury. It seems to me likely that insect bites would have the same effect, and that the phenomenon may be expected to recur under natural conditions.— R. G. LEAVITT, Ames Botanical Laboratory, North Easton, Massachusetts.

Potamogeton spathaeformis a probable Hybrid in Mystic Pond.— The very local plant which was discovered in 1850 by the late Edward Tuckerman in Mystic Pond, Medford, Massachusetts, and called by him *Potamogeton spathaeformis* has never been found elsewhere in America, and is not known to fruit. In Cambridgeshire, England, however, it is known to Mr. Alfred Fryer to fruit, although not abundantly, and Mr. Fryer has maintained that it is a hybrid between *P. heterophyllus* and *P. angustifolius*. The late Dr. Thomas Morong, while admitting the possibility that Mr. Fryer's interpretation is correct, said: "but a weighty argument against this view is the fact that neither of the supposed parents occurs in Mystic Pond, and that it should be produced in localities separated by the Atlantic ocean."[1] In view of Dr. Morong's positive statement, therefore, it is important to record the fact that in the Gray Herbarium there is a sheet of very characteristic *P. angustifolius* collected by the late Wm. Boott in "Mystic Pond, August 26," (presumably in the 60's); and that in both the Gray Herbarium and the herbarium of the New England Botanical Club there are characteristic specimens of *P. heterophyllus* collected in Mystic Pond by Messrs. E. & C. E. Faxon. There is, then, no reason, as maintained by Dr. Morong, why *P. spathaeformis* should not have originated by the hybridizing of *P. angustifolius* and *P. heterophyllus* in Mystic Pond as well as in Cambridgeshire, England.— M. L. Fernald, Gray Herbarium.

[1]Morong, Mem. Torr. Cl. iii. no. 2, 27 (1893).

Vol. 8, no. 94, including pages 189 to 204, was issued 25 October, 1906.

BOTANICAL PUBLICATIONS

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Vol. 8. December, 1906. No. 96.

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BLUMENBACHIA INSIGNIS A CASUAL PLANT AT SOUTHBRIDGE, MASSACHUSETTS.

LUCIUS E. AMMIDOWN.

THE town of Southbridge, Massachusetts, seems to be a very prolific field for the botanist. For a number of years the writer has made botany a recreation, and has found 874 species and varieties growing in Southbridge. Mr. Fred. W. Rowley, a classmate and friend of the writer, has found in the same way 900 species and varieties within the limits of the town, not including 13 garden escapes, and 47 found along the border of adjoining towns. Each has found many that the other has not seen, so that together we have over 1000 species and varieties as growing within the limits of Southbridge. Each has kept a list of his plants. This includes several of which only a single plant has been seen; also several adventive plants brought here through one means or another. Mr. Rowley is foreman of the wool-sorting department of the Hamilton Woolen Company. This company buys large quantities of wool from Australia, South America, our Western States, and wherever good wool can be obtained. This wool brings with it from other countries many seeds, especially such as are provided with hooks, or are enclosed in burs that cling to the wool. Of course some of these seeds get scattered about the mill yard, and thus plants unknown to this section are produced. Last spring, or early summer, Mr. Rowley called my attention to a plant that had made its appearance near the mill. In due time he announced that it had blossomed, but that he could not find it in our botanies. I went to the place, and there it was, a curiosity surely, the flower a little white star, with red and yellow center. But woe to him who would examine the plant too closely, for it produced a shock that exceeded any nettle

with which I have come in contact. Trailing on the ground, the plant now covers a space perhaps 30 inches or so in diameter. I took some of it home, but soon gave up the botany, and opened Century Dictionary to the word "Nettle." There I found "Chili Nettle," with reference to its order "Loaseae," under which much to my delight I found a fairly good description of our plant. Next I sent a specimen to Gray Herbarium, getting from there the information that the plant is *Blumenbachia insignis*, a native of Chili, and probably unknown, outside of cultivation, in North America. Since then we have found it in Gray's School and Field Botany as a native of Chili. Stem round, with fine stripes of darker green, and covered with long, stinging hairs. Leaves opposite, palmately veined and divided (much resembling leaves of the Skeleton Geranium), their upper surface covered with long hairs, the lower pubescent. Flowers single, nodding, on long, axillary peduncles. Petals 5, cucullate, white, ending with an acute point. Five scale-like petals inside the others and alternate with them, erect, with yellow base and red tips, resembling a corona. Stamens, with slender filaments, in 5 sets, opposite the white petals. Also 10 sterile filaments, in pairs, opposite the inner petals. Style one, long-exserted, stiletto-shaped, pubescent. Sepals 5, short, lanceolate. Ovary inferior, 1-celled, spirally twisted, covered with hairs.

Other adventive plants from the mill yard are *Amarantus spinosus* L., *A. crispus* Braun., *Artemisia annua* L., *Xanthium spinosum* L., *X. Canadense* Mill., *Vernonia Baldwinii* Torr., *Solanum rostratum* Dunal, *Helenium tenuifolium* Nutt., and *Eleusine Indica* L.

Some of these have already spread beyond the confines of the Mill yard, showing a disposition to make themselves at home. Other strange plants have started but are not yet sufficiently developed to be identified.

SOUTHBRIDGE, MASSACHUSETTS.

AN ALPINE VARIETY OF SOLIDAGO MACROPHYLLA.

M. L. Fernald.

Botanists who have collected in the Alpine Garden of Mt. Washington are familiar with a dwarfed extreme of *Solidago macrophylla* which, in some characters other than its low stature, differs from the common tall plant of the wooded slopes of the White Mountain region. The plant of the woods, which is widely distributed through the coniferous forests from Newfoundland and southern Labrador to Lake Superior, south to central Maine and New Hampshire, Mt. Monadnock, Mt. Greylock, and the Catskills, has the involucre of the oblong-cylindric heads composed of linear-attenuate thin, often scarious, bracts. In the plant of the Alpine Garden, on the other hand, the involucre of the much fuller and broader subglobose heads is composed of shorter narrowly deltoid to lanceolate firmer, often subherbaceous, bracts.

As it occurs on Mt. Washington, the alpine plant with broader heads and broader firmer bracts is generally considered an extreme of the woodland *S. macrophylla.* Further north, however, where the latter species with narrow bracts and oblong heads is the commonest goldenrod at low altitudes, it gives way, in the alpine and exposed situations, to the larger-headed plant with broader bracts, so generally as to indicate that this plant is worthy more definite recognition than is ordinarily given it. Thus, in the Gaspé Peninsula of Quebec the typical *S. macrophylla* of Pursh, the plant with oblong heads and linear-attenuate bracts, is everywhere abundant in woods and clearings from sea-level to the wooded mountain-slopes. In the alpine and subalpine regions, however, of the great tablelands of Mt. Albert and of Table-topped Mountain, the common representative of *S. macrophylla* is the plant with broad subglobose heads (in extreme specimens 2 cm. in diameter), which abounds over fully a hundred square miles of alpine meadows and slopes.

Still further north, on the Labrador coast, likewise, the plant of exposed situations is like the large-headed plant of the Alpine Garden. In fact, all the material known to the writer from north of the Straits of Belle Isle is of this plant; and there is no question that it is *S. thyrsoidea* which was described in 1830 by Ernst Meyer from Okkak (latitude 57° 30′) on the Labrador Coast. The same plant, as found

in the Alpine Garden of Mt. Washington, was also recognized by A. P. de Candolle as distinct from Pursh's *S. macrophylla.* In the Prodromus, in 1836, de Candolle described the White Mountain plant as *S. leiocarpa.*[1] His material, sent by "Dr. Boot" in 1830 from the White Mountains, is, as shown in the Prodromus Herbarium, the characteristic plant of the Alpine Garden.

In interpreting the earlier *Solidago macrophylla* of Pursh[2] we are naturally at a disadvantage from the meagre description and from the fact that the type is apparently not extant.[3] Pursh's description was taken from "*Herb. Banks. mss.*" and the plant, "about three feet high" with "calycibus oblongis" came from "Canada." The "Canada" of Banks was, of course, the low forested eastern region where the tall plant with oblong heads and linear-attenuate bracts abounds and where the other is unknown; and it is very safe to assume that this common plant was rightly identified by Dr. Gray[4] as *S. macrophylla.*

The two plants here discussed are ordinarily well distinguished, but since the only characters by which they seem to differ are those of size of head and breadth of bracts, both features which show a wide range of variation and a strong tendency to intergradation, it is probable that they are best treated as extreme phases of one plant: the woodland *S. macrophylla* of eastern Canada and the upland regions of New England and New York with oblong heads and linear-attenuate thin mostly scarious bracts; and an extreme variation of it growing in more alpine or subarctic regions and characterized by broader subglobose or oblong-ovoid heads and lanceolate to narrowly deltoid greener bracts. This plant of the Labrador coast and of our alpine regions should be called

Solidago macrophylla Pursh, var. **thyrsoidea** (E. Meyer) n. comb. *S. thyrsoidea* E. Meyer, Pl. Lab. 63 (1830). *S. leiocarpa* DC. Prodr. v. 339 (1836).— Labrador, at various coastal stations: Quebec, alpine and subalpine regions of Mt. Albert and of Table-topped Mountain: New Hampshire, Alpine Garden, Mt. Washington.

Gray Herbarium.

[1] DC. Prodr. v. 339 (1836).

[2] Pursh, Fl. 542 (1814).

[3] See Gray, Proc. Am. Acad. xvii. 187 (1882).

[4] Gray, l. c.

PECULIARITIES OF BOTRYCHIUM LANCEOLATUM IN AMERICA.

Arthur Stanley Pease and Albert Hanford Moore.

While recently examining at the Gray Herbarium specimens of *Botrychium lanceolatum* (Gmel.) Angstr., we were struck by the dissimilarity of the European and American material. The European plants are distinguished by a coarser habit and by the broader and much more approximate segments of the sterile frond. And their differences are illustrated not only by the European specimens in the Gray Herbarium, but also by various plates, among them Flora Danica, vol. xvii, pl. 1922, fig. 2 (1877). The ordinary American plant is well represented by the plate in D. C. Eaton, Ferns of North America, vol. i, pl. 5, fig. 2 (1879). A specimen from the island of Unalaska, collected in 1881 by L. M. Turner agrees with the European plant. The following description gives the salient features of the common American plant:

Botrychium lanceolatum (Gmel.) Ångstr. var. **angustisegmentum** Pease et Moore var. nov. pinnarum segmentis distantioribus quam in speciei exemplis angusteque lanceolatis insignitum.—

Type specimen: Maine, Bristol, July 19, 1897 (*E. B. Chamberlain*, no. 354, in herb. N. E. B. C.).

Other specimens examined: Nova Scotia, Truemanville, July, 1885 (*H. Trueman*): New Brunswick, Fredricton, September 16, 1872 (*J. Fowler*): Maine, Bridgewater, 1881 and 1882 (*K. Furbish*); Brownville, July 1, 1905 (*J. C. Parlin*); Dover, June 24, 1895 (*M. L. Fernald*); North Berwick, 1893 (*J. C. Parlin*): New Hampshire, Randolph, 1900 (*A. S. Pease*, no. 6); Mt. Chocorua, 1904 (*W. G. Farlow*); Flat-top Mt., Sandwich, June 17, 1899 (*J. H. Sears*); Alstead, July 4, 1899 (*M. L. Fernald*, no. 174): Vermont, Equinox Mt., July 3–4, 1903 (*W. W. Eggleston*, no. 3172): Massachusetts, Andover, June 28, 1902 (*A. S. Pease*, no. 5); Sudbury (*E.* and *C. E. Faxon*); Adams, August 27, 1901 (*M. A. Day*, no. 100): New York, Palisades (*C. F. Austin*): New Jersey, Closter, August, 1865 (*C. F. Austin*).

Cambridge, Massachusetts.

A new Station for Asplenium pinnatifidum.—*Asplenium pinnatifidum* Nutt. is a species hardly known to New England collectors. In the summer of 1902 a plant of it was found at Sharon, Connecticut, by Mr. E. I. Huntington and a note stating the fact was published in the Fern Bulletin, xi. 14 (Jan. 1903). This was the first and has remained the only reported station for the plant in New England. The honor of discovering a second station in Connecticut for this interesting little fern belongs to Mr. H. C. Bigelow of New Britain, Connecticut. Mr. Bigelow is an enthusiastic student of our ferns and in the summer of 1906 found three plants of *A. pinnatifidum* growing on an outcropping ledge of shale in Southington, Connecticut. It was growing with *Asplenium platyneuron* Oakes, and *Camptosorus rhizophyllus* Link, and there was at first some question whether it might not be a form of the much discussed *A. ebenoides* R. R. Scott, but a careful comparison with other material showed there could be no doubt as to its identity with *A. pinnatifidum* Nutt. The station at Sharon is about twelve miles farther north than Southington, but the latter station is more than thirty miles farther east, bringing the range of this fern well into the central part of Connecticut. One of the plants found at Southington has been placed at the Gray Herbarium.— C. H. Bissell, Southington, Connecticut.

Principles of Botany.[1]— It was to be expected that Mr. Bergen and his associate Dr. Davis, authors of the new "Principles of Botany" recently published by Ginn & Co., would make an excellent text-book. Both have had long experience as teachers, both are eager students and investigators, each in his chosen field of the science, and both are able to command forcible and lucid English. Thus the book is eminently readable. Mr. Bergen, besides, from previous success in the same line, knows how to put a text-book together. In this volume he has divided the field with his associate, taking the chapters on the structure and physiology of seed-plants, as well as those on ecology and economic botany, and leaving to Dr. Davis the treatment of morphology, evolution, and classification of plants.

Mr. Bergen's chapters embody a fresh treatment of topics which he has already shown ability to present in his earlier text-books. The arrangement is even better than before. Especially commendable (though not new) is the combination of demonstrations of structure

[1] Bergen and Davis. pp. v + 555. Ginn & Co., Boston, 1906.

with exposition of function. The separation or absolute divorce of these kindred and mutually explanatory topics in many text-books and also in the class room has always been deplorable, but there are signs that in the near future no botanical teaching, even of the simplest kind will be considered acceptable that does not treat the plant as a living thing, and try to show how its organs perform their work. Teachers will find much that is suggestive also, and much to draw them and their classes out of doors in the concluding chapters on plant formations, plant geography, and kindred subjects.

Mr. Bergen's definitions might occasionally be bettered. For instance, the opening sentence of chapter one speaks in traditional terms of the seed as "reproducing the kind of plant which bore it," thus suggesting at the outset a meaning for the word *reproduce* which has to give way later to a much more exact conception of reproduction as distinguished from mere growth. In just this point a text-book ought not to err. So much depends on the exact use of terms, that a teacher must weigh well every word in order not to plant wrong ideas which, like weeds, go on to flourish, and have to be uprooted later. No teacher enjoys weeding an intellectual garden, and he should be especially careful himself to sow only pure seed. Another instance of the same kind is the first definition of the term cell (p. 9) as a "microscopic compartment," replaced later (p. 35) by a second definition — from the biological standpoint — as "a unit of protoplasm, called a protoplast" —and again by a third (p. 158, by Dr. Davis) as "a small mass of protoplasm containing a nucleus.' Definitions two and three are italicized in the text.

Of Dr. Davis's chapters almost everything to be said must also be in commendation. His is the harder subject as a matter of presentation, for it is much more complicated and unfamiliar in detail, and necessarily for a beginner bristles with technicalities. The descriptive portion, rich in material and clear in wording, should be easily comprehensible to students intelligent enough to use a compound microscope. The philosophical portion will doubtless be over the heads of all but mature students. It is certainly necessary nowadays to interpret the results of studies in comparative morphology from the evolutionary point of view, but it is none the less difficult, for we are led at once into a region of uncertainty and speculation. In this region a beginner will surely feel the ground insecure, and will have to be forgiven for failure of comprehension, or for that skepticism

which is often in a pupil a welcome sign of intelligence. In his views on evolution and classification, Dr. Davis cannot be accused of being behind the times. In fact, in his advocacy of the hypothesis — advanced only six months ago by one of his pupils[1] — of the sporophytic nature of the tetrasporic plants in the Red Algae, he is suggesting (p. 219–p. 220) and even asserting (p. 222) a theory not yet generally accepted or even generally known. This course seems at least unwise in an elementary text-book.

On one topic, of some practical importance, Dr. Davis seems to be satisfied with a treatment that is at once popular and superficial. He does not do justice to the fleshy fungi, or even show great knowledge of them. We should rather expect to be told, for instance, (p. 253) that truffles are subterranean. We have a right to demand that the definition of so important a structure as the *volva* (p. 266) should be explicit and correct. Dr. Davis is following a popular misconception in making this term equivalent to the popular term *cup*, applied to the sheath or bag that encloses the base of the stipe in Amanita. The volva is much more than this. His error becomes serious, even dangerous, when he teaches that poisonous Amanitas all have large *volvas* (i. e. *cups* according to the text). As is well known, *Amanita muscaria* a deadly species common everywhere has a *volva* which is broken into scales on stipe and pileus, and has no cup at all.

The book has abundant and clear illustrations throughout — many of them original, especially those of Dr. Davis.

Two Editions of Torrey & Gray's Flora of North America. — Some time ago my attention was called to variations in copies of Torrey & Gray's Flora of North America, volume 1, which seem to indicate that some portions have been reprinted. An examination of the type shows that pages 321 to 360 (signatures 41 to 45) inclusive were reset in a slightly different font, so that, while the amount of matter is the same on each page, that of the lines often varies. The Greek letters and figures show clearly the change of type: for instance, the base line of the 2 and the top line of the 7 are curved in the original but straight in the reprint. On page 324 and 325 of the original

[1] Yamanouchi: Bot. Gaz. xli. 425–433. June, 1906.

the names *Hosackia micranthus* and *H. prostratus* appear, while in the reprint these names are corrected to *H. micrantha* and *H. prostrata.* Page 329 of the original bears the number 42, but this is omitted in the reprint. The title-pages of several copies of the work show no indication of a second issue, and why this substitution was made or at what date I am unable to state.— HOWARD W. PRESTON, Providence, Rhode Island.

JUNCUS COMPRESSUS IN THE PROVINCE OF QUEBEC.— A rush which Mr. A. S. Pease found growing abundantly on the Plains of Abraham near the city of Quebec, 30 Aug.–1 Sept., 1904, has been determined as *Juncus compressus* Jacq. This plant, a close relative of the common "black grass" of our salt meadows, is common in inland situations throughout the greater part of Europe and Asia, but has not been reported from America. Although probably introduced on the Plains of Abraham, it is a rush which might be expected to occur as a native in northeastern America, since in general its distribution is parallel to that of a number of rushes of broad range which have been found in the maritime provinces and northeastern states.

The characters by which *Juncus compressus* may be distinguished from the black grass, *Juncus Gerardi* Lois., are somewhat technical. In *Juncus compressus* the anthers are little if at all longer than the filaments, in *Juncus Gerardi* they are thrice as long; in *Juncus compressus* the style is much shorter than in *Juncus Gerardi*; in *Juncus compressus* the sphaeric-obovoid capsule is conspicuously longer than the outer tepals, whereas the ellipsoid capsule of *Juncus Gerardi* is usually about the same length as the tepals. A strong tendency, which cannot, however, be relied upon to separate the plants, is for the primary bract to be longer than the inflorescence in *Juncus compressus* and shorter in *Juncus Gerardi.*— H. H. BARTLETT, Gray Herbarium.

ERRATA.

Page 12, line 20; *for* July *read* June.
" 57, " 10; " fig. c *read* fig. b.
" 59, " 38; " *V. Bernardi* read *V. perpensa.*
" 65, " 16; " dele the figure [1].
" 86, " 12; " *filifolia* read *filifolium.*
" 86, " 20; " *erisetum* read *Trisetum.*
" 88, " 20; after *Trisetum subspicatum muticum* insert Bolander in.
" 106, " 47; *for* pine *read* spine.
" 106, " 48; " efer *read* refer.
" 111, " 18; " **linealis** read LINEARIS.
" 111, " 44; " **linearis** read LINEARIS.
" 112, " 35; " C. gracilis read *C. gracilis.*
" 141, " 34; " *interruptum* read *interrupta*
" 144, " 34; " *pennsylvanica* read *pennsylvanicum.*
" 146, " 15; " Kunnebunk *read* Kennebunk.
" 167, " 32; " Murdock, *read* Murdoch.
" 168, " 22; " 90 *read* 91.
" 187, " 8; " Peteskey *read* Petoskey.
" 195, " 3; " *virgatula* read *virgatulum.*
" 195, " 9; " *roselum* read *roseola.*
" 198, " 37; " for know *read* known.
" 210, " 19; " *melanocarpum* read *melanocarpa.*
" 214, " 11; " his specimens *read* Dr. Bigelow's specimens.
On title-page of April number; *for* Proceedings *read* Records.

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